

FEATURED ARTICLE

New Vehicles— Technology Impact on Collision Repair Costs

By Hans Littooy

Vice President, Consulting and Professional Services |
Mitchell Auto Physical Damage



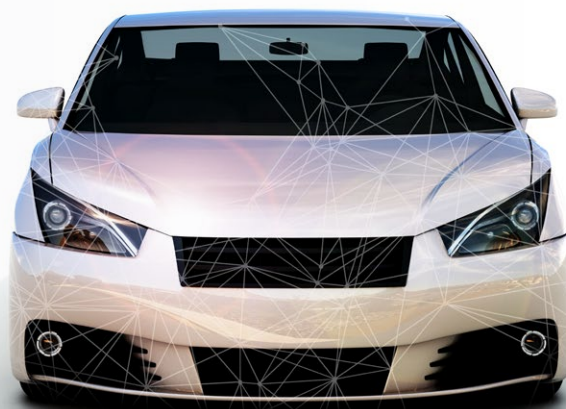
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A Message from the CEO

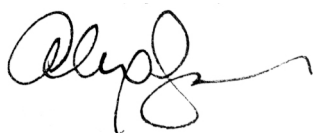
The Latest Technology Trends and Industry Insights

Welcome to the Q4 edition of the mPower by Mitchell Auto Physical Damage Industry Trends Report. At Mitchell, we're passionate about how technology can deliver greater value to our customers. In previous issues, we've often shared insights into how cutting-edge technologies like artificial intelligence are transforming claims processes. This quarter, I explore how the Property & Casualty and collision repair industries can use an existing technology, video chat, in new and innovative ways to enhance claims processes.

A much-discussed topic at SEMA this year, and one that is always at the forefront here at Mitchell, is the issue of proper and safe repairs. This quarter, APD General Manager, Debbie Day, shares her views on this important issue. Another hot topic is cloud technology. Mitchell CTO, Erez Nir, writes about what is top of mind for him as Mitchell transitions to hybrid cloud while Director of Marketing, Rebecca Janzon, offers Five Reasons Collision Repair Facilities Should Make the Move to Cloud.

This latest report is also packed full of other useful information and insights, including an article on how incorporating advanced technologies like sensors and cameras into vehicle redesigns is affecting collision repair costs, as well as a thoughtful article on the important role collision repair shops can play in informing consumers of and addressing safety recalls.

You can find these articles and many more on the [mPower by Mitchell website](#), our latest resource for technology trends and industry insights. I encourage you to check back often.



Alex Sun | President and CEO | Mitchell



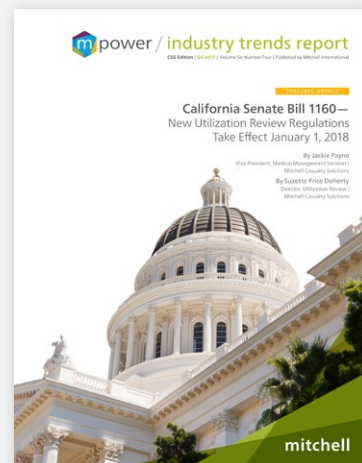
Alex Sun
President and CEO | Mitchell



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Ensuring Mitchell's Cloud Transition Is Safe, Secure and Stable for Our Customers

[illegible]

While Mitchell has been exploring, testing and even migrating our internal business systems to the cloud for several years, the launch of Mitchell Cloud Estimating marks a milestone on our journey. Like many companies, [Uber](#) [and Dropbox](#) among them, we have settled on a hybrid public / private solution, putting specific workloads where they function best and best serve our clients' needs. This article provides insight into what matters most on this journey—our clients, the safety and security of their data, and the stability of their software.



According to IDC, by 2020, people will stop referring to the cloud as public and private, and sometime thereafter, it will stop being called the cloud at all—it will simply be the “way business is done and IT is provisioned.” For established enterprise software companies with existing hosted systems, the transition to the cloud—whether public, private or a hybrid of both—is inevitable, but it is not straightforward.

As the CTO of Mitchell, a company making an ongoing transition, I often get questions—from CTOs of other software companies, from clients, and from our employees—about our plans for adopting cloud technology. With that in mind, I’d like to provide some insight into our journey to cloud to date, the past experience that has informed it, and what has been and will continue to be top of mind as we continue down this path.

A History of Adaptation

As an established technology company, Mitchell’s previous experience adapting to technology advancements is guiding how we transition to the cloud. Initially, we owned our own data centers, a solution that worked well for us and our clients. As the company grew and the business environment evolved, we were looking to scale more efficiently and more keenly focus on our core competency—creating software and solutions that automate complex claims processes and inform decision making around insurance claims management. We made a strategic decision to get out of the data center business. At the same time, virtualization was becoming mainstream, allowing for a reduced hardware footprint, and co-location was becoming more sophisticated and affordable. These market trends came together in a way that made the transition to a co-located environment viable.



"Like the transition to our hosted environment, we are taking a strategic, measured approach to our transition to cloud, keeping our clients' need for stability a top priority."

We took a strategic, measured approach to the transition, and it served us well, resulting in no disruptions to our clients’ businesses. Through careful planning and implementation, we achieved our business goals while architecting a state-of-the-art hosting solution, enhancing disaster recovery capabilities, and keeping pace with growing market expectations for uptime and business continuity. We also transferred many of the environmental aspects of modern hosting, like real estate management, cooling, and power, to an outside organization more directly focused on them. Today, Mitchell’s data centers are co-located in third-party data centers in both the U.S. and Canada (because Canadian regulations mandate that some data be kept within Canadian borders).

Like the transition to our hosted environment, we face many challenges in our continued transition to the cloud. But we are taking the same strategic, measured approach we've employed in the past, keeping our clients' need for stability a top priority.

Co-Location to Cloud— Some Things to Consider

Chief among the concerns that enterprise software companies—and their clients—have as they make the transition to the cloud, are security and privacy. No company can afford a data breach—the costs to customers, brand, and bottom line are too significant. This is especially true for companies that handle sensitive data that is subject to regulatory oversight.

One thing to keep in mind is that no software system and its associated data—whether it is on-premises, co-located, or in a public, private, or hybrid cloud—is inherently secure. All systems must be carefully architected for security wherever potential vulnerabilities exist, from infrastructure to application. To that end, cloud providers like Amazon and Microsoft

"Cloud providers like Amazon and Microsoft take extraordinary measures to secure their environments, often above and beyond what their average client could do."

take extraordinary measures to secure their environments, often above and beyond what their average client could do. But that's only part of the equation. As Gartner explains, "the secure use of public clouds requires explicit effort on the part of the cloud customer." The cloud customer must design their system for maximum security and then be vigilant in monitoring and maintaining it. At Mitchell, we are committed to keeping clients' data safe. Building in comprehensive security and privacy measures—and continuing to enhance them as technology advances—is one of our foremost considerations as we implement cloud technologies.



"The cloud customer must design their system for maximum security and then be vigilant in monitoring and maintaining it."

Another concern for enterprise software companies as they transition from on-premises or hosted software to the cloud, is a skill set mismatch. The skills and experience necessary to develop, deploy, and manage software over a company's own infrastructure are somewhat different than what is required in a cloud environment. As companies make this transition, they will continue to need the technical talent, knowhow, and institutional knowledge of existing teams and individuals, and they will need to support them in developing new skills and expertise as well. It helps that such a transition does not take place overnight. For most companies going through this transition, it should happen gradually and thoughtfully, over a number of years, providing time for employees to acquire additional expertise along the way.

Getting a handle on the cost structure isn't easy, either. When an enterprise software company builds its own infrastructure, it builds it in anticipation of peak usage—rush hour, essentially. From there, it's fairly straightforward to map costs to a growth trajectory. But when you don't own that infrastructure and you're charged to use it based on volume or instances, things can get complicated quickly. Cloud providers' models for predicting usage and costs are incredibly complex, and as a result, companies



"Building in comprehensive security and privacy measures—and continuing to enhance them as technology advances—is our foremost consideration."

making the transition sometimes face significant, unanticipated fees. It's a little like choosing a cell phone plan based on anticipated usage when you have no point of reference—only the stakes are much higher. The financial perspective is further complicated when a company moves its infrastructure to the cloud, because traditional and well-understood capital expenditures move to a monthly operational cost. It's simply a different financial model that requires careful planning.

A Strategic, Measured Approach

Taking our cue from the lessons we learned as we transitioned away from operating our own data centers, Mitchell is taking a strategic, measured approach to our transition to a hybrid cloud. Our objective now, as it was then, is to embrace the benefits of technology advancements as they make sense for both our business and our clients' businesses. The technology must be able to support the complexity of our solutions. The long term financial implications must be fully understood as well. And the transition must be made with no measurable disruption to service.

"Our objective is to embrace the benefits of technology advancements as they make sense for both our clients' businesses and ours."

To this end, Mitchell has been actively exploring cloud technology on a number of fronts. In fact, we first started looking into it when Microsoft Azure was announced in 2008. After some exploration, we discovered we were just too early—the services available at that time could not properly support the solutions we were considering moving there. During this time, we also started migrating our internal business systems—CRM, financial systems, learning management, etc.—to SaaS providers. In doing so, we have learned what to look for in negotiating and working with cloud service providers in terms of uptime, security, costs, and other key issues. Further, we are bringing tools on board to move some of our software development environments into the cloud, and learning along the way.

Ultimately, Mitchell delivers software solutions that our clients depend on to solve business problems. Cloud technology is the most contemporary, preeminent enabler of software delivery at large scale, and if moving to the cloud will help us better serve our clients, then we will continue to make that transition.

"I foresee us continuing our journey toward cloud in a way that results in the best outcomes for our company, our employees, our clients, and their customers."

Mitchell will continue taking a strategic, measured approach, as we did when we co-located our data centers with third-party vendors. Reliability is absolutely essential to our clients, and we are deeply committed to ensuring that throughout the process. With the launch of [Mitchell Cloud Estimating](#), Mitchell is taking steps toward a hybrid private/public cloud. I foresee us continuing this journey carefully, over a number of years, and in a way that results in the best outcomes for our company, our employees, our clients, and their customers.

Message from Debbie

Information is the Key to Proper & Safe Vehicle Repair

By Debbie Day | Executive Vice President and General Manager | Mitchell Auto Physical Damage



"While it may seem obvious, accessing the appropriate repair data, when and where it is needed, is not always straightforward."

A much-discussed topic at SEMA 2017 was a recent court case in Texas and subsequent verdict that found that previous vehicle repairs had deviated from OEM recommended repair procedures and thereby contributed to occupant injuries. This may well represent a watershed moment for our industry. It presents an opportunity for every party in the collision repair ecosystem—OEM, insurance company, collision repairer and suppliers—to reevaluate what is necessary to deliver a proper and safe repair. Ultimately, we all have a stake in ensuring a vehicle has been properly repaired, that it is once again roadworthy, and that the vehicle owner can feel confident that it is safe for them and their passengers to occupy.

Based on conversations with our customers and Mitchell Advisory Council members, I know proper and safe repairs are top of mind. And as a general

manager of an organization that serves as an active participant in this ecosystem, the role we all play weighs heavily on my mind. It is my belief that one of the important things we can do as an industry to support collision repairers in delivering proper and safe repairs is to encourage open access to the most current data required to repair a vehicle to OEM standards. While it may seem obvious, accessing the appropriate repair data, when and where it is needed, is not always straightforward.

Following OEM Repair Procedures

As technology advances and onboard computers, sensors linked to vehicle safety systems, special materials, etc., are becoming more prevalent, repair procedures are becoming increasingly specialized and complex. There are more than [263 million vehicles](#) on the road in the U.S. as of 2015, the last year for which numbers are available, and

the definition of what constitutes proper and safe repair varies widely between every make, model and year. Current estimates indicate that a collision technician needs to reference more than 500,000 pages of repair information to correctly execute repairs today, up from just 5,000 pages a decade previous. It would be a tall order for even the most experienced repair technician to keep up with all of that information—and each new model year brings more.

The good news is that almost every automotive manufacturer currently provides repair procedures for their vehicles, and those that don't are well down the path of developing them. OEM repair procedures detail what is required to repair a damaged vehicle based on original manufacturer repair standards. They cover everything from critical safety issues like when and where a vehicle should be welded, as in the Texas case, to cosmetic issues such as painting instructions. By following repair procedures, collision repairers are better able to deliver proper and safe repairs, return the vehicle to pre-accident function and appearance while ensuring its roadworthiness.

Accessing OEM Repair Procedures—Easier Said than Done

Having access to repair procedures is only the first step. In order for a repair shop to be able to incorporate them into their workflow, they need to be able to access them when and where they need them—essentially in context, while creating the estimate and doing the repair. Again, this is more complex than it seems.

Often, when a collision repairer creates an estimate, they have to look up each repair procedure one-by-one outside of the estimating system and then modify the estimate based on what they find. That may mean going back-and-



forth between multiple software systems and sorting through massive amounts of information that is not relevant to the current repair. This is time consuming, complex and potentially error prone.

Here's what's needed: an open, secure, and cloud-based system that allows the most up-to-date repair procedures to be accessed by collision repairers so that they can quickly and accurately access just the information they need from within the estimating system. That information could then become an artifact within the system that then becomes a part of the vehicle's repair record, encouraging transparency and accountability across the ecosystem.

Putting Vehicle Sensor Calibration to the Test

At Mitchell, we believe OEM repair procedures aren't the only sticking point when it comes to proper and safe repairs. The average late model vehicle has 60 to 100 computer control modules

and sensors, with that number growing to over 200 as cars become increasingly more complex. Many of these sensors directly link to safety systems—think backup cameras, blind spot detectors and occupant classification systems that use sensors to identify passengers who do not meet minimum weight requirements and prevent airbags from deploying.

While sensors and control modules were not a part of the Texas lawsuit, ensuring they are properly calibrated is essential to proper and safe repair. The impact of a collision, even one that does not directly strike a sensor, could be enough to push the margin of error on a sensor calibration out of the tolerance zone. How serious is this? Think of it this way: an improperly calibrated backup camera or sensor could mean the difference between backing out of your driveway safely or backing into a pole, or worse yet, a person you didn't see.

Just recently I had my car in for routine maintenance. I thought it was running fine: it looked great, ran great and no dashboard lights indicated there was any cause for concern. Imagine my surprise when we plugged my car into Mitchell's [Diagnostics](#) system and more than 30 diagnostic trouble codes fired. In my case, it was a low-voltage condition that activated the trouble codes. But consider this—a mere visual inspection of a vehicle is no longer enough. Whether post-accident or routine repair, when working on vehicles with advanced driver assistance systems and other electronic safety systems, the use of pre- and post-repair vehicle scans is an important part of ensuring a vehicle is safe to put back on the road.

Mitchell Is Committed to Doing our Part

As I said at the beginning of this article, we all have a stake in ensuring a vehicle has been safely and properly repaired.

Read more about pre- and post-repair vehicle repair scanning

At Mitchell, we're committed to doing our part. Initiatives like [Program Freedom](#), which encompasses delivery of a cloud-based and open platform to the APD industry is a part of this. As the APD industry faces unprecedented challenges due to increasing vehicle complexity, technology, collision frequency, and severity, Program Freedom is designed to help the industry face these challenges. Freedom is based on [Mitchell Cloud Estimating](#), our new cloud-based estimating and communications platform. We integrated Mitchell Diagnostics into Cloud Estimating this summer. As of December 2017, in-context repair procedures will be reality within Mitchell Cloud Estimating. On January 17th, we'll be demonstrating for customers and partners how Program Freedom offers the solutions best suited for executing safe and proper repairs. You can register here: [The Program Freedom Experience](#).

We believe, and continue to actively invest in, the open and free data exchange to aid our industry in the delivery of proper and safe repairs using the latest in data security technologies.

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How Video Chat Is Enabling New Types of Interactions in the Claims Process

By Alex Sun | President & CEO, Mitchell

At a time when artificial intelligence-powered chatbots are making significant inroads in the insurance industry, another, more familiar technology is also gaining traction—video chat. When measured by the recent, rapid pace of technology advancement, video chat is a relatively “old” technology, but it’s enabling new types of personalized experiences, particularly in healthcare, and making its way into the claims process in new, innovative ways.



First, some background: Skype first launched video calls on Windows in 2006, but it wasn't until 2010 that it was available on mobile, the same year Apple launched FaceTime on the iPhone 4. Interestingly, Facebook's other messaging platform, WhatsApp, is the biggest messaging platform in the world, and they just rolled out video chat last year. In their first six months of service, 1.2 billion users in more than 180 countries spent more than 350 million minutes a day making more than 55 million video calls. If there were any question before, it's abundantly clear that consumers are ready and willing to adopt the technology.

Video Chat Enables Virtual House Calls

The healthcare industry has aggressively adopted video chat in an effort to make care more accessible, less costly, and to deliver better outcomes. Telehealth companies like Doctor on Demand, Teledoc and MDLive are proliferating. According to the AMA, 70 percent of all healthcare visits could be done virtually. For workers' compensation claims the number may even be higher since 75 to 78 percent of claims involve less complex injuries and illness relative to personal health.

Seven of 10 patients would prefer virtual care if given the option. Sixty percent of large, U.S. employers provide coverage for telemedicine consultations, including Mitchell. We offer this service to our employees through our healthcare plan.

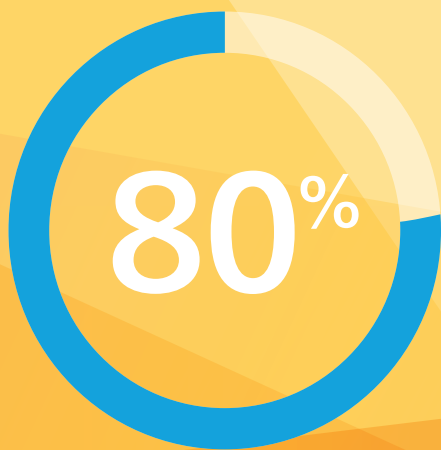
Video Chat Goes Beyond the Office Visit

Office visits are not the only things that have gone digital. It's being incorporated into other types of healthcare workflows. In Iowa, for example, a company called NuCara combines telepharmacy consultations with remote dispensing sites so people in rural areas can get easier access to their medications. Kmart Pharmacy plans to convert some of their traditional pharmacy with on-site pharmacists to a telepharmacy model. In early tests, customer feedback indicated that the video chat experience actually felt more personal. Meanwhile, in an effort to reduce costly, unnecessary ambulance rides to the hospital, the city of Houston has implemented a program called Emergency Telehealth and Navigation (ETHAN).



7 of 10 patients
would prefer virtual care
if given the option.





ETHAN has resulted
in an **80% reduction**
in unnecessary hospital
transports

ETHAN allows first responders to video chat with doctors who triage patients and determine if they need to be transported to the hospital or can be treated at the scene. The program has resulted in an 80 percent reduction in unnecessary hospital transports, reduced the time from evaluation to transport in actual emergencies, and in many cases, reduced the cost to patient from \$2,200 to \$220.

Video chat is also having an impact on the way physical therapy is delivered. One of the biggest challenges with physical therapy is getting people to comply with their prescribed exercise regimen at home, but tele-rehabilitation means a physical therapist can be right there in the room with the patient, providing encouragement, ensuring that the exercises are done correctly and for the proper length of time, and actually observing progress, or lack thereof.

Video Chat in the Claims Process

Insurers of all types are looking to video chat to streamline and personalize the claims process. Liberty Mutual offers a video chat service called RealTime Review™ that allows homeowners to connect with a claims representative via FaceTime or Skype to assess damages and initiate a claim. Allstate offers “Virtual Assist,” an app that lets repair facilities video chat with adjusters for approval of supplements. The app is unique in that it is staffed by trained adjusters who are available on demand, reducing the time for approval from days to minutes, and ultimately, accelerating the repair process.

The Best Technology Is the Right Technology to Meet the Need

According to a recent study by Tata Consultancy Services, the insurance industry is on the forefront of investing in artificial intelligence. While computer vision, machine learning natural language processing and other AI technologies hold incredible promise across the claims continuum, and we are exploring these here at Mitchell, it’s important to note that the best technology to solve a challenge, expedite a process or connect with a customer may not always be the most current or cutting edge technology. Sometimes an “old” technology applied in new ways can bring about better outcomes for both insurer and claimant.



“According to a recent study by Tata Consultancy Services, the insurance industry is on the forefront of investing in artificial intelligence.”

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New Vehicles— Technology Impact on Collision Repair Costs

By Hans Littooy

Vice President | Consulting and Professional Services |
Mitchell Auto Physical Damage



Vehicle manufacturers have always been innovators, constantly experimenting with new technology and new ways to keep us safe in the event of an accident. Recent advances, using sophisticated collision avoidance systems which have quickly become commonplace in new vehicles can help us avoid accidents altogether. While these systems often utilize innovative technologies and components, which contribute to substantially safer driving, these same components also have an impact on collision repair costs and underwriting.

While Original Equipment Manufacturers (OEMs) have been experimenting with collision avoidance systems since the late 1950s¹, significant advances did not occur until the mid-1990s when Hughes Research Labs produced the first commercially viable systems. This led to the technology appearing in earnest between 2004–2012 as OEMs introduced the technology into their higher-end luxury models during product re-designs and refreshes.



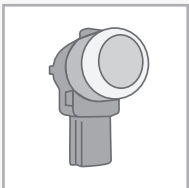
1959 Cadillac Cyclone XP-74 concept car with radar-based collision avoidance system located in the two nose cones.

Modern collision avoidance systems consist of radar, laser (LIDAR), and camera-based systems. These systems provide not only collision avoidance capabilities by automatically applying the brakes, they also provide adaptive cruise control and park assist capabilities.

Specific components for these systems include park assist sensors, front impact sensors, vehicle radar/speed sensing systems, surround cameras, laser systems (LIDAR) and more. As avoidance systems become more prolific and components more readily available, they are increasingly being added not only to luxury cars, but also to many of the latest mass-market vehicles, across multiple price points and styles. This means that collision avoidance systems, and the parts and labor needed to repair them, are present throughout the entire repair industry.

Collision Avoidance, Park Assist, and Adaptive Cruise Control Components.

Small devices, high costs



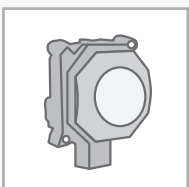
Typical Park Assist Sensor

Average Cost: \$170—\$199
Up to 6 per front bumper
Up to 4 per rear bumper



Front View Camera

Average Cost: \$500—\$900
1 per front grill area
1 in rear bumper area



Front Wave Radar Sensor

Average Cost: \$600—\$900
1 per front grill
or bumper area

"Modern collision avoidance systems consist of radar, laser (LIDAR), and camera-based systems."

In reviewing the average cost for several common collision avoidance components, these highly sophisticated gadgets are by no means an inexpensive replacement if damaged. Unfortunately, these components are most commonly found in the areas most prone to collision impacts—the front and rear bumper areas of vehicles. Within Mitchell's Industry Trends Report, "Growth in Special Materials and Its Impact on Estimating" from Winter, 2017 it was shown that there is an average increase in vehicle repair costs of approximately \$458 for vehicles with specialty materials vs. those without. In this article, we'll examine how collision avoidance, park assist, and adaptive cruise control systems affects the cost of repair for vehicles outfitted with these systems—virtually all new vehicles.

Analysis Approach:

An absolute approach was taken to try to answer the question of the impact that collision avoidance, park assist, and adaptive cruise control systems have on vehicle repair costs. As the collision data on recently refreshed or redesigned vehicles is still maturing, especially for 2017 and 2018 models, the analysis approach taken was to compare recently redesigned vehicles and directly compare the repair costs to their prior generation vehicle. This would yield an accurate apple-to-apple comparison on the potential repair costs.

Vehicle Selection:

The criteria for the vehicle selection were:

- Major redesign of the vehicles or significantly refreshed vehicles. A prior generation of the vehicle, substantially similar in size and purpose, must exist.
- Brand new models that did not have a prior generation equivalent were not considered.
- The average/typical configuration was selected; high-end or special editions (i.e., Mercedes AMG line) and exotic cars are not included.

For model years 2016 and 2017, there are approximately 30 vehicles that were introduced to the market that met the above selection criteria. Higher selling vehicles, with a cross section from sub-compact vehicles to luxury sports utility vehicles were selected to see the impact of technology advances on claims severity across several different types of vehicles.

Parts Selection:

Vehicle collisions and repairs are typically to the front or rear-end of vehicles, where much of the new technology is applied, so the focus of the analysis is on those parts of the vehicles only.

All parts and net labor for the following areas are included:

- Front-end: All bumper, grill and lamps.
- Rear-end: All bumper and lamps.

If a sensor is available as either standard or an option for a specific vehicle, it is included. These selection criteria applied to both the new redesigned model year and the prior generation, if the parts were available. Lastly, only OEM parts were used in the analysis.



For model years 2016 and 2017, there are approximately 30 vehicles introduced to the market that met the selection criteria.

Labor Rates:

Labor rates between \$55 for body repair and up to \$95 for mechanical repair were used for all vehicles. These rates may be on the low side of industry averages, but highlight the impact of parts and parts prices versus the impact of labor rates.

Not Included:

While many of the following operations may be required for a proper repair or may be impacted in a front-end or rear-end collision, these operations are excluded from the analysis:

- Any pre- or post-diagnostics scans, reprogramming, or retargeting of the systems and sensors.
- Repairs related to airbags (SRS), front inner structures, radiators, condensers, the rear body related were not considered, albeit these vehicle systems would undoubtedly have been impacted by moderate collision.

Table 1: Cost Impact on Front-End and Rear-End of Newly Redesigned Vehicles:

Vehicles			Latest Generation		Prior Generation		% Change from Prior Generation	
Year	Make	Model	Front	Rear	Front	Rear	Front	Rear
2017	Audi	A4	\$6,129	\$4,228	\$4,982	\$3,321	23%	27%
2017	Buick	LaCrosse	\$6,293	\$4,360	\$5,960	\$4,671	6%	-7%
2017	Chevrolet	Cruise	\$3,725	\$3,150	\$2,359	\$3,379	58%	-7%
2017	Ford	Escape	\$5,135	\$3,096	\$3,195	\$2,499	61%	24%
2017	Honda	Civic	\$2,655	\$1,662	\$2,878	\$1,777	-8%	-6%
2017	Mazda	MX 5	\$4,104	\$2,316	\$3,294	\$2,696	25%	-14%
2017	Mercedes	E Class	\$11,757	\$6,201	\$15,247	\$5,378	-23%	15%
2016	Chevrolet	Camaro	\$4,115	\$4,427	\$2,470	\$2,999	67%	48%
2016	Chevrolet	Malibu	\$5,420	\$4,561	\$4,357	\$4,510	24%	1%
2016	Chevrolet	Volt	\$4,103	\$3,641	\$4,655	\$3,339	-12%	9%
2016	Hyundai	Elantra	\$4,552	\$3,131	\$4,637	\$2,864	-2%	9%
2016	Lexus	RX 330	\$12,533	\$6,271	\$4,216	\$5,144	197%	22%
2016	Mini Cooper	Clubman	\$3,979	\$3,437	\$3,792	\$2,732	5%	26%
2016	Nissan	Maxima	\$6,752	\$2,426	\$2,915	\$2,039	132%	19%
2016	Toyota	Prius	\$7,628	\$3,452	\$3,736	\$1,969	104%	75%
Totals			\$88,880	\$56,359	\$68,892	\$49,315	29%	14%
Total Combined			\$145,239		\$118,208		23%	

Reference: Mitchell Estimating, September 2017 Data

Note: For the totals, this is the basic average and does not factor in vehicle weighted volume.

Results:

Table 1 highlights the total parts and labor costs to replace all the major parts for the front- and rear-end of the current model year vehicle compared to the prior generation.

The data shows that although not every newly redesigned vehicle experienced an increase in claims severity, most do. The primary cost drivers are the increased use of sensors, radar systems (especially on the luxury vehicles), and headlamps on the redesigned vehicles. For example, in the redesigned 2017 Chevrolet Cruise, although the

new model year did not include more sensors, the cost of the headlamps increased by over \$300 each, attributing to most of the cost increase from the prior generation.

Conclusion:

Adoption of technology on newly redesigned vehicles is having a pronounced impact on their repair costs. Adding parking assist sensors, wave radar systems, front-end and rear-end cameras, as well as more elaborate front lamp systems is adding, on a simple average, 23% to the repair cost compared to the prior generation.

ABOUT THE AUTHOR



Hans Littooy

Vice President, Consulting and Professional Services | Mitchell Auto Physical Damage

Hans Littooy joined Mitchell's Product Management team in August of 2003. While in Product Management, Hans was responsible for the release of Mitchell's highly successful WorkCenter Review Suite and was awarded two patents for innovations around estimating compliance. In 2009, Hans transitioned into his current role, VP of Consulting and Professional Services, leading a team of consultants who assist our carriers with improving their claims workflow and efficiency. He is also responsible for our customer implementations and integrations and is a lead author for Mitchell's Industry Trends Publication. Hans began his career designing rocket engines used in NASA's expendable launch vehicle program in the late 1980's and later was in product management for Cummins Engine Company and Caterpillar's Gas Turbine division. Hans is originally from the Pacific Northwest where he earned his BS in Mechanical Engineering from Washington State University and later a Master's in Business from the University of Michigan. Hans enjoys restoring classic 1960's muscle cars and actually performs the body and paint work himself!

While actuarial departments may traditionally use other factors to price insurance policies for new redesigned vehicles, with the advent of new substrates and advanced technology now being introduced rapidly into the latest designs, underwriting may want to consider this additional potential repair cost information in determining how to more accurately price policies for the latest generation of vehicles.



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References:

¹ General Motors 1959 Cadillac Cyclone prototype had radar installed on two front cones with the intent to detect forward collisions.

Mitchell Estimating, September 2017 Data

Estimating Elevated— 5 Reasons Collision Repair Facilities Should Make the Move to the Cloud

By Rebecca Janzon

Director of Product Marketing | Mitchell Auto Physical Damage



"According to IDG, the average company has 45% of its IT environment in a cloud."

The concept of cloud computing has rapidly moved from being a transitional technology to mainstream as companies and industries recognize the need to provide efficient and agile solutions for their organizations. According to IDG, the average company has 45% of its IT environment in a cloud. Cloud computing in the simplest terms is the delivery of computing services over the Internet instead of your computer's hard drive. Cloud computing services mainly fall into three broad categories: infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS).

When it comes to SaaS, typically the provider hosts, manages and supports the software and rather than receiving a disk to install on your own computer drive, you log into a site on the

Internet to access software, servers, databases or other services. Today, using cloud-based software is no longer a tactical solution but rather a strategic enabler of driving faster adoption of new technologies that enable businesses to work faster and more efficiently.

The automotive industry is rapidly changing due to vehicle complexity, repair costs, increased use of telematics by OEs, consolidation within the repair market—the list goes on. The impact of these changes is most inherently felt by collision repair facilities who find themselves in the middle of having to adapt to the new technology, to keep training up-to-date, to replace old equipment among other things, all while maintaining a profitable business. Every auto repair facility requires a certain level of investment, or

operational cost, to perform while looking to increase productivity.

One area where collision repair facilities should look for increased productivity is within their software, especially their estimating solutions. Every year, collision repair facilities and independent appraisers write literally tens of millions of claims for cars damaged in car accidents or natural disasters. Writing these estimates faster and more efficiently is the name of the game. While new bell and whistle features tempt repair facility owners with increased productivity, one area often ignored is the impact that cloud computing can have on a repair facility.

Here are five reasons why collision repair facilities should consider cloud solutions to improve efficiency and profitability:

1. Any Device/Any Browser

Cloud solutions are available anywhere, anytime, from any device from just about any browser.

Estimators, independent appraisers or technicians can simply login online and begin capturing customer information to write accurate estimates. They allow staff to leave their desks and write the estimate right where the vehicle is located—be

"Every year, collision repair facilities and independent appraisers write literally tens of millions of claims for cars damaged in car accidents or natural disasters."

it outside the shop or somewhere in the field. With cloud computing, any Internet connection lets staff "set up office" anywhere with the ability to access estimating software on a PC, tablet or mobile phone, in the shop or out in the field.

2. Maintenance Free

The beauty of cloud computing is that software updates no longer require a package of disks from the supplier that need to be installed and updated on every computer in your facility. They don't



Cloud solutions are available anywhere, anytime, from any device from just about any browser.

require installation, maintenance, or ongoing downloads to the device on which you choose to work. New features and minor bug fixes are automatically rolled out seamlessly, requiring nothing more than logging in to access them.

3. Increased productivity

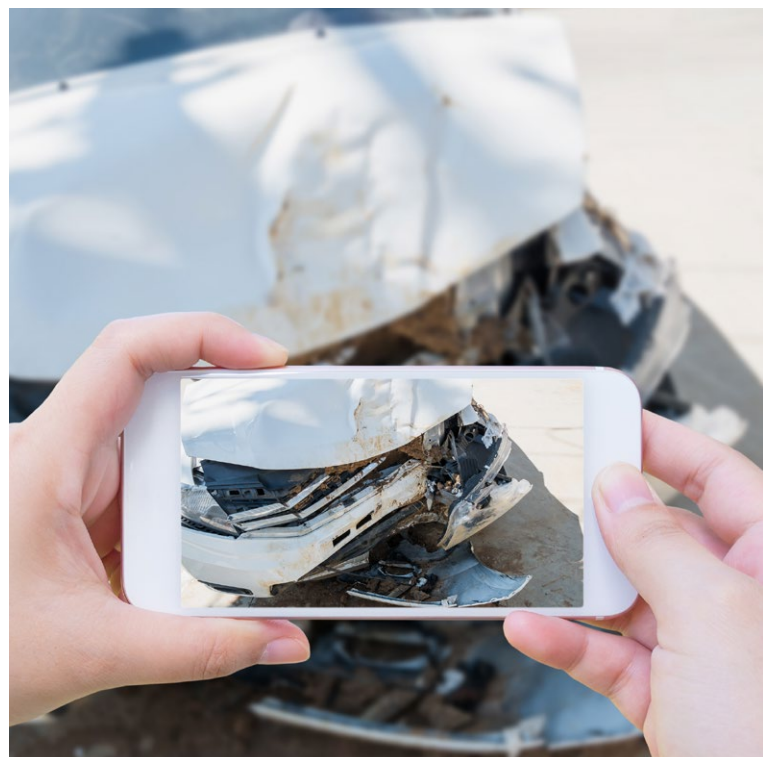
Cloud solutions can decrease the time required to write estimates, as well as average keys-to-keys cycle time by placing needed information at estimators' fingertips—anywhere. This available anywhere, anytime feature of cloud solutions helps to increase the speed and accuracy of the estimating process. Cloud computing solutions also utilize modern, easy-to-learn and easy-to-use design, which saves time on training on how to use the system, making users more productive and efficient faster.

4. Reduced infrastructure costs

Cloud computing gives greater flexibility when developing your IT infrastructure. Because your data is stored in the cloud, you can access it without having to build an expensive and burdensome server network and resources to maintain it. Suppliers roll out regular software updates—so you don't have to worry about wasting time maintaining the system yourself. This leaves you free to focus on the things that matter, like growing your business.

5. Competitiveness

Moving to the cloud gives access to enterprise-class technology, for everyone. It allows smaller



businesses to act as fast as big, established competitors. Pay-as-you-go service and cloud business applications mean small outfits become David and can compete with the larger Goliaths.

With today's ever changing and increasingly competitive collision repair environment, it's time for collision repair facilities to find new ways to increase productivity and streamline processes and cloud computing is the answer.

Mitchell recently launched the industry's first fully cloud-based estimating software, Mitchell Cloud Estimating. Read more about it [here](#).

[READ MORE](#)

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Making the Most Out of Your Data: 4 Tips for Engaging with Claims Consultants

By Ryan Mandell

Director, Performance Consulting | Mitchell Auto Physical Damage



"We have identified four best practices that provide the best chance for success before, during and after engaging with a claims consultant."

For insurance carriers, finding ways to capitalize on the growing volume and velocity of information is a critical challenge. We have experienced a lifetime of automotive technological change in just the past decade and it is becoming increasingly difficult to stay in front of the latest advancements in repairing today's complex vehicles while still leveraging data to manage an efficient and profitable claims operation. Engaging with an expert consulting partner that combines data and analytics with deep industry experience can help make the most of the data generated and collected in claims systems and operational databases.

Partnering with outside personnel with a broad foundation of industry expertise to assess claims data and thoroughly analyze results alongside

industry benchmark data and analytics can make a significant impact on your business—often resulting in greater efficiencies and effectiveness across many different processes. Leveraging a consulting partner who works hand-in-hand with you to help reach the next level of claims management is one of the clearest paths to achieving actionable insights that have the ability to transform an organization.

As with any engagement, however, there are a few key tips to follow that lay the groundwork for both your team and the consultant to be effective. We have identified four best practices that provide the best chance for success before, during and after engaging with a claims consultant:

1. Rally Internal Stakeholders

Introspection is an often overlooked step in any project. It is necessary to assemble a cross-functional team that represents stakeholders such as field appraisal units, DRP networks, auditors, and internal adjusters to align the organization's needs and expectations for the upcoming consulting engagement. Doing so not only creates organizational harmony but also gives the consultant the opportunity to hit the ground running.

2. Choose Wisely

Not all consulting partners are created equal. It is critical to select the correct partner that brings to the table the ideal combination of industry knowledge and innovative technical resources. An ideal consultant should not only be well versed in the automotive claims space, but should also have the tools available to produce real value to your organization. The ability to leverage cutting edge analytical tools such as synthetic

peer algorithms, and advanced, customizable scorecards to accurately benchmark and measure ongoing performance are just a couple of the baseline capabilities to look for.

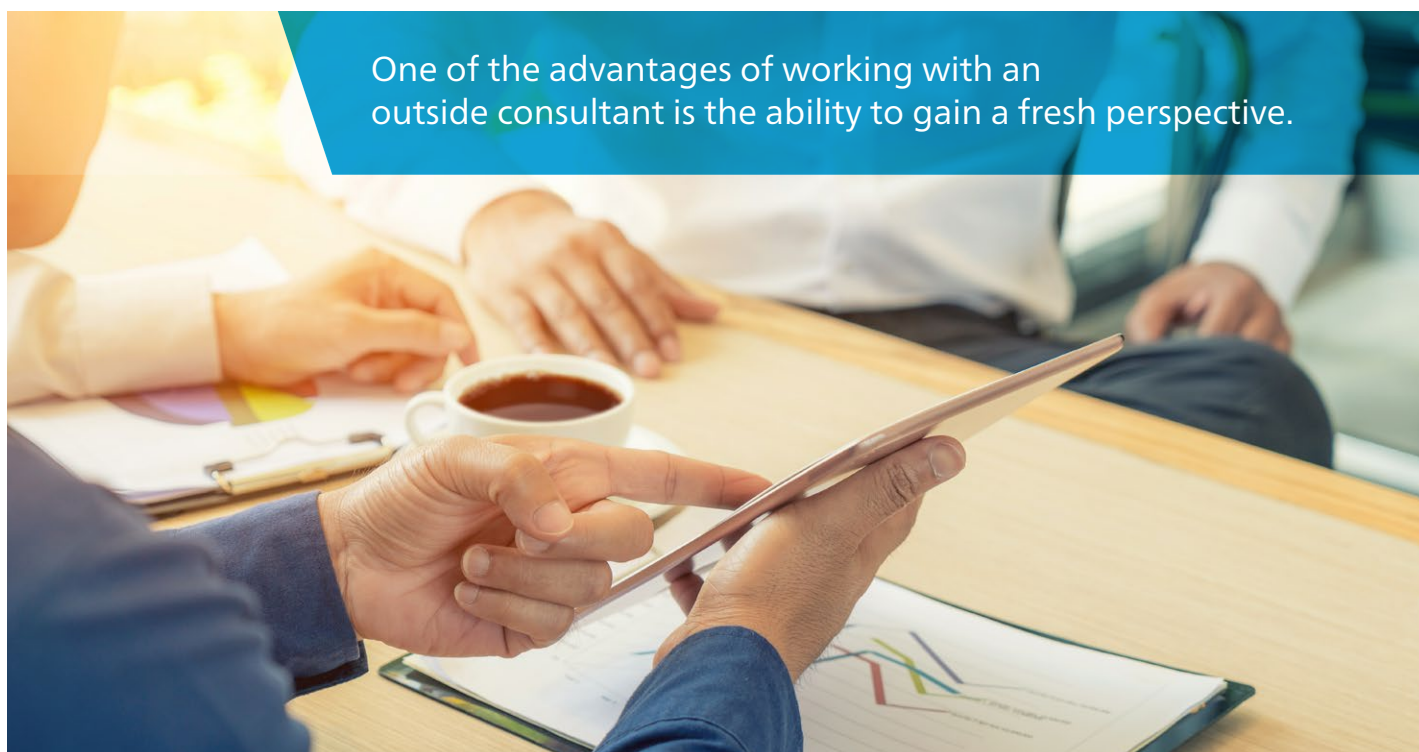
3. Have an Open Mind

One of the advantages of working with an outside consultant is the ability to gain a fresh perspective. A consultant may bring some ideas and concepts to your company that differ greatly

"Not all consulting partners are created equal."

from how things have always been done, and may challenge your comfort zones. Be willing to consider new ways of thinking and the possibility of disrupting your own organization. One of the key benefits of the avalanche of data we now

One of the advantages of working with an outside consultant is the ability to gain a fresh perspective.



have to work with is the potential for uncovering relationships or correlations—aka opportunities—we could never have discovered on our own. This will naturally challenge our willingness to embrace new opportunities and new recommendations, so those who can accept change, who are willing to eschew old practices, will thrive in the increasingly competitive marketplace of tomorrow.

4. Play the Long Game

To elevate the success of your claims results, it's essential to approach performance with a set of clearly defined goals. Be prepared to discuss with your consultant your vision for the organization and agree on a set of ongoing targets using advanced methods of benchmarking that help fulfill that vision. Challenge yourself and your team to develop new metrics that provide richer insights into your unique business. The collision repair process has changed dramatically over the past 30 years, yet our industry still utilizes a static set of KPI's that were developed around the time as the first unibody structure! When your company implements recommended changes, ongoing monitoring procedures should also be employed as well, so the changes can continually be optimized to their full potential. You should be monitoring the data consistently to see if new trends are developing so you can make adjustments and proactively manage the processes.

With the industry in a constant state of flux, meaningful partnerships are now more important than ever, and true partnerships are not built on transactions, but rather on the collaborative achievement of common goals. Engaging with a consultant who believes in this foundation and is committed to long term, mutual success



To elevate the success of your claims results, it's essential to approach performance with a set of clearly defined goals.

turns possibilities into reality. These beliefs all serve to extract the greatest value from carriers' data resources. While many consulting services simply drop-in, assess, and make one-time recommendations, partners who work to implement continuous action plans and measure the effect of those changes alongside clients' organizations often have the greatest positive impact. Carriers that commit to making the most out of a partner who has the data resources, combined with the depth of industry expertise AND the willingness to take action are poised for sustainable success.

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Bonus Article

Making Recall Data Available When it's Most Valuable— At the Time of a Vehicle Repair

By Rebecca Janzon

Director of Product Marketing | Mitchell Auto Physical Damage



"Upon issuing a recall notification, vehicle manufacturers are required to fix the problem by repairing it, replacing it, offering a refund, or in rare cases repurchasing the vehicle."

Today there are tens of millions of vehicles driven on roads all across the United States that have open recalls for safety systems or other non-safety issues. As a US Federal agency, the National Highway Transportation Safety Agency, [NHTSA](#), regulates the safety of motor vehicles and related equipment. It lies within their jurisdiction to issue vehicle safety standards and require manufacturers to recall vehicles and equipment that have safety-related defects.

Anyone can report an issue with any vehicle to the NHTSA. The process is as simple as reporting the complaint for the alleged safety violation on the NHTSA website. When the NHTSA receives a number of similar complaints they launch an investigation to determine if there is in fact a safety risk to consumers, and if so, does the manufacture need to issue a recall notification.

A vehicle manufacturer or the NHTSA issues recall notifications when they determine that an entire vehicle, piece of equipment, car seat, or tire creates an unreasonable safety risk or fails to meet minimum safety standards.

While NHTSA has the legal authority to require manufacturers to issue a recall, vehicle manufacturers make most decisions to voluntarily conduct a recall and remedy a safety defect prior to any involvement by NHTSA. Upon issuing a recall notification, vehicle manufacturers are required to fix the problem by repairing it, replacing it, offering a refund, or in rare cases repurchasing the vehicle.

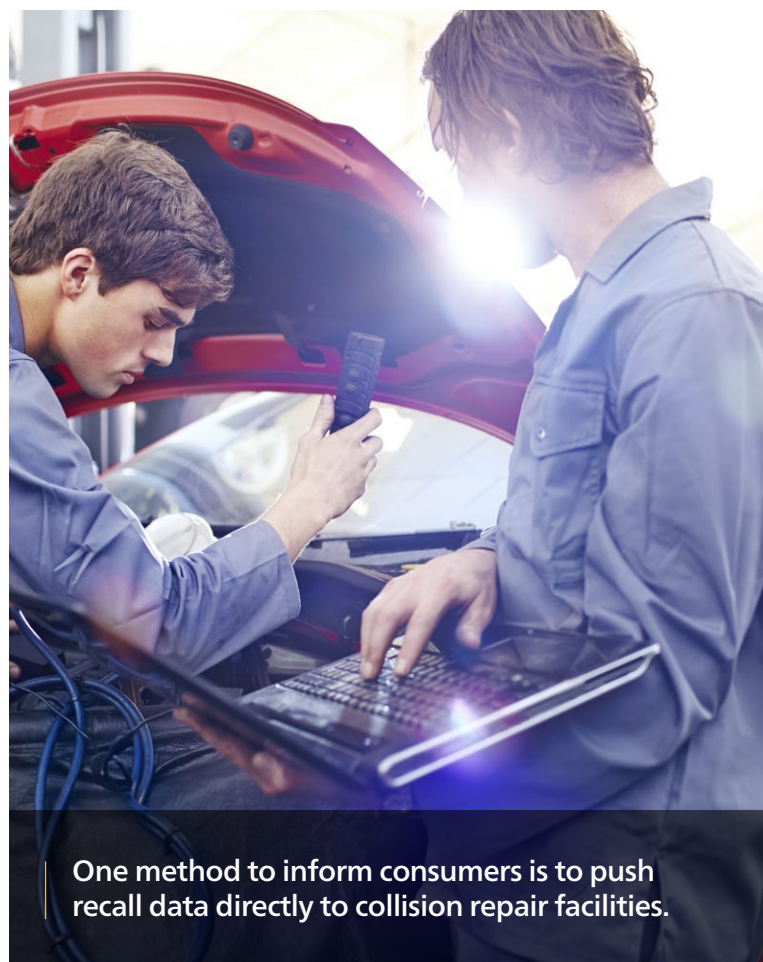
Quickly and efficiently notifying a vehicle owner of a related safety recall and their right to have it corrected is a challenge for vehicle manufacturers. Alerting consumers that their new vehicle

purchased from a dealer has a recall notification is a rather straightforward process. The dealer has the consumer name, address and VIN number and can notify their customers directly from their own database. However, used vehicles are bought and sold everyday and there is no national database of used vehicle ownership. The burden of understanding if there are any recall notifications lies with the current owner of the vehicle. Yet, there are many consumers who don't know about the recalls; and that their vehicle may have a potential safety system issue.

To help consumers understand and track if their vehicle has any recall, the NHTSA offers a vehicle identification number or VIN look-up on their website. Consumers, insurance carriers or repair facilities can enter the VIN data and receive information on safety related recalls or they can access the [monthly report](#) produced by NHTSA to determine if their vehicle has an open recall. While this data is readily available, unless the recall has generated media coverage, most consumers won't have it top of mind to check safety recalls on their vehicle.

The most well-known and recent recall is for Takata air bags. Millions of air bags are subject to recall due to a safety defect that may cause the air bag inflators to explode and cause serious injury or death. According to NHTSA, the expansion of the Takata air bag recall means that by December 31, 2019, the total number of airbags being recalled will be somewhere between 65 and 70 million. Even though this recall has received immense media coverage, there are millions of vehicles on the road and potentially millions of consumers unaware their vehicle is subject to this recall.

One method to inform consumers is to push recall data directly to collision repair facilities. Imagine a scenario where every time a vehicle goes into a collision repair facility open recalls are instantly displayed any time a VIN number is entered into the facility's collision estimating system.



One method to inform consumers is to push recall data directly to collision repair facilities.

Being able to notify a consumer that their car has recalls at the time of an estimate allows the vehicle owner and collision repair facility to determine the best course of action. This could be incorporating needed repairs into an existing estimate, creating a new estimate to repair the recall defects or taking the vehicle to a dealership after the collision damage is repaired.

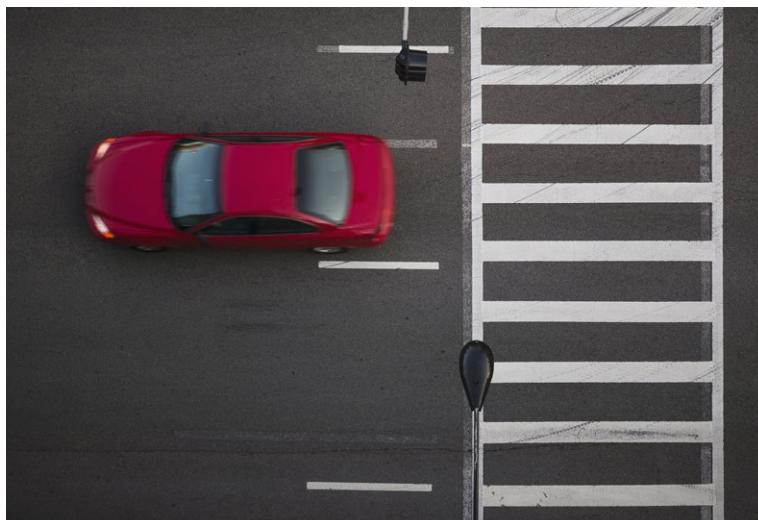
This scenario is a win-win for both vehicle owners and collision repair facilities. Owners will know if there is a recall on their vehicle and repair facilities can potentially generate incremental revenues repairing recall related issues that they might otherwise not have known about.

Mitchell recently announced instant access to real-time vehicle manufacturers' VIN-specific recall notifications directly in its estimating systems. Read more [here](#).

Average Length of Rental for Repairable Vehicles

U.S. Length of Rental—Q3 2017

By Dan Friedman | Assistant Vice President | Collision Industry Relations and Sales,
Enterprise Rent-A-Car | Mitchell Auto Physical Damage Solutions



"The average LOR ranged from a high of 13.7 days in the Mountain region to a low of 10.6 in the Pacific."

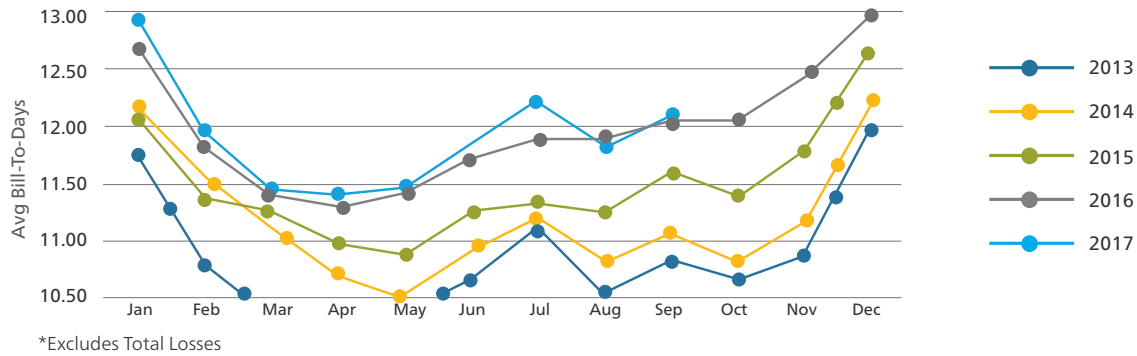
Average Length of Rental (LOR) for Q3 2017 landed at 12.1 days in the United States, an increase of just .2 days compared to Q3 2016. This is a continuation of the general course throughout the calendar year, although a few months produced measurable increases.

Once again, there was very little consistency between regions and states, suggesting that the quarterly result for the U.S. is not reflective of a genuine national trend. The Mountain and Northwest regions produced the largest increases at 1.4 and .6 days respectively, while the Southwest declined .6 days for the second consecutive quarter. The average LOR ranged from a high of 13.7 days in the Mountain region to a low of 10.6 in the Pacific. At the state level, Colorado and North Dakota were outliers at 15.1 and 8.8 days, respectively.

At least 20 states deviated significantly in terms of year-over-year change, further demonstrating a lack of consistency. Colorado (2.2), Puerto Rico (1.5) and Wyoming (1.2) produced the largest increases. Colorado and Wyoming continue to struggle with capacity issues exacerbated by a series of recent hail storms. The most significant decreases in LOR included Washington D.C. (-2.0), Texas (-.9), Arkansas (-.6) and North Dakota (-.5). Texas remained more than 1.5 days above the U.S. average (13.6) with the recent hurricane activity. As anticipated, however, Texas' Q3 numbers improved as it recovered from severe hail storms and flooding in the spring of 2016.

LOR continues to climb each quarter in the U.S.—mostly due to an ongoing increase in the number of miles driven and claim frequency as well as in the level of complexity of repairs. It is important to

US Industry Avg Length of Rental



note the increasing number of new car sales with enhanced vehicle technology and their impact on the collision repair industry. So, although the upward trend appears to be slowing compared to 2016, we expect to finish the year at or near a historic high in average LOR.

As mentioned in previous updates, there remains a significant delta between average and best in class. Collision centers that invest in extensive training, properly utilize the ARMS® Auto application, and consistently execute a robust scheduling strategy routinely outperform market-average LOR metrics.

Canada Length of Rental—Q3 2017

Average Length of Rental (LOR) for Q3 2017 landed at 11.1 days in Canada, up .7 days over last year's Q3 results and .4 days higher than Q2 2017.

The LOR gap between the U.S. and Canada is narrowing—from 1.5 days in Q3 2016 to 1.0 day in Q3 2017. While the U.S. increased only marginally over last year's Q3 results, Canada was up more than half a day.

There was a large variance in provincial LOR results, similar to the lack of consistency seen among the U.S. regions. While New Brunswick was the only province to see a decrease during the quarter, compared to last year, six provinces posted increases ranging from .7 to 1.9 days. The

most significant increases were in Nova Scotia and Newfoundland, adding more than a day to their results for the third quarter.

Overall, Canada's LOR ranged from a low of 8.7 days in Prince Edward Island (PEI) to a high of 11.7 days in Newfoundland. Ontario, the most populous province, experienced the second highest LOR at 11.6 days. Provinces that outperformed the national average include Quebec, New Brunswick, Nova Scotia and PEI.

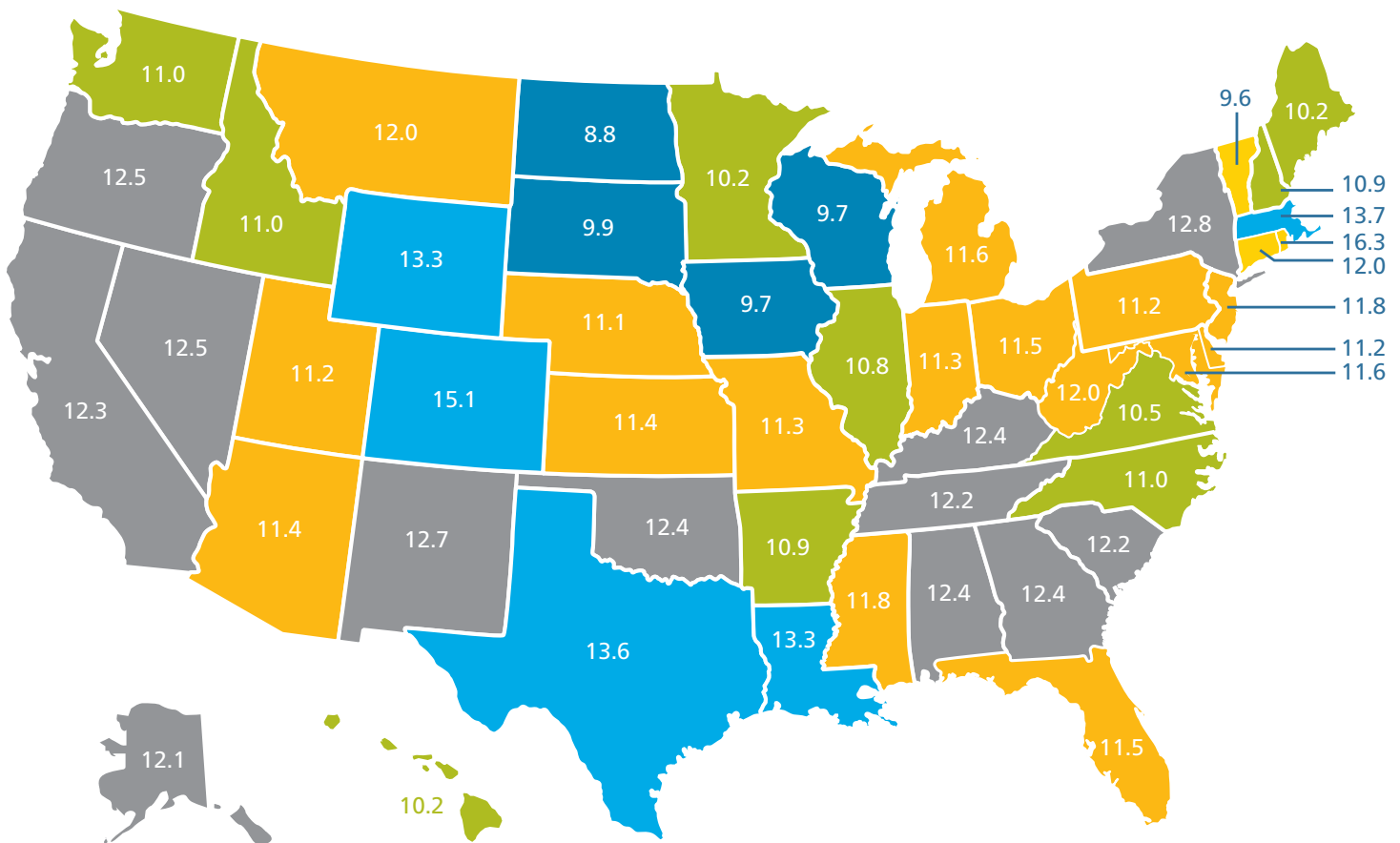
Canadian LOR continues to increase on a quarterly basis. Kilometers driven and complexity of repair remain core drivers of LOR trends. It is important to note the increasing number of new car sales with enhanced vehicle technology and their impact on the collision repair industry. According to Global Automakers of Canada, Canadian new car sales were up 7.7% in September year over year. Truck sales made up 70% of the new car sales volume. Year-to-date, new car sales currently exceed 1.5 million for Canada.

As mentioned in previous updates, there remains a significant delta between average and best in class. Collision centers that invest in extensive training, properly utilize the ARMS® Auto application and forecast reporting, and consistently execute a robust scheduling strategy routinely outperform market-average LOR metrics.

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U.S. Average Length of Rental (LOR) by State Q3 2017



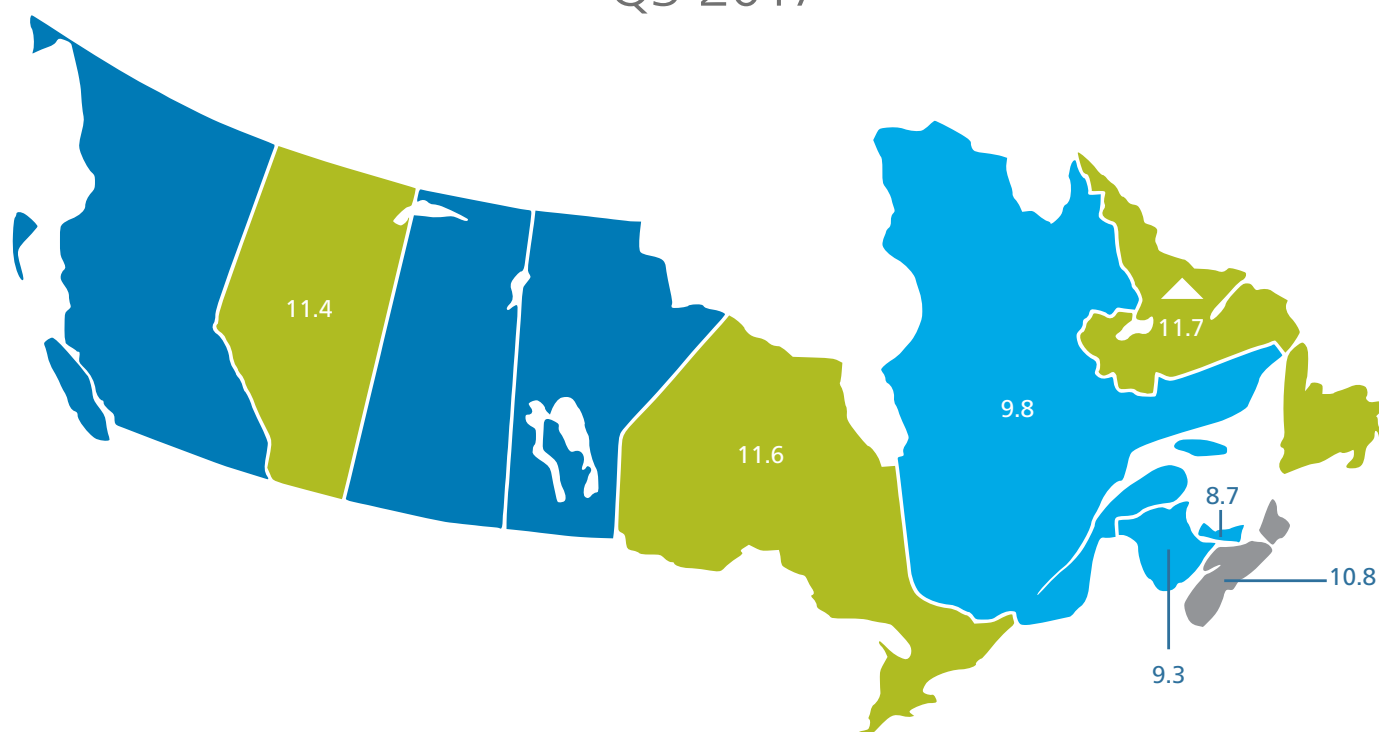
Average Billed Days for U.S.		
Q3 2016	Q3 2017	Change
11.9	12.1	0.2

At least 20 states deviated significantly in terms of year-over-year change, further demonstrating a lack of consistency.

Average Billed Days for U.S. by Region			
Region	Q3 2016 LOR	Q3 2017 LOR	Change
California	12.3	12.3	0.0
Mid-Atlantic	11.2	11.2	0.0
Midwest	10.7	11.1	0.4
Mountain	12.3	13.7	1.4
Northeast	12.5	12.7	0.2
Northwest	10.9	11.5	0.6
Pacific	10.2	10.6	0.4
Southeast	12.0	12.0	0.0
Southwest	13.8	13.2	-0.6

Canadian Average Length of Rental by Province

Q3 2017



Year-Over-Year Change

Source: Enterprise Rent-A-Car. Includes ARMS® Insurance Company Direct Billed Rentals; Excludes Total Loss Vehicles.

Average Billed Days for Canada		
Q3 2016	Q3 2017	Change
10.4	11.1	0.7

The quarterly LOR summary is produced by Dan Friedman, Assistant Vice President Collision Industry Relations and Sales at Enterprise Rent-A-Car. Dan has 21 years of experience with Enterprise working within the collision repair industry. Through its ARMS® Automotive Suite of Products, Enterprise provides collision repair facilities with free cycle time reporting with market comparisons, free text/email capability to update their customers on vehicle repair status, and online reservations. More information is available at armsautosuite.com or by contacting Dan Friedman at Daniel.Friedman@ehi.com.

Average Billed Days for Canada			
Province	Q3 2016 LOR	Q3 2017 LOR	Change
Alberta	10.6	11.4	0.8
Ontario	10.8	11.6	0.8
Quebec	9.1	9.8	0.7
Newfoundland and Labrador	9.8	11.7	1.9
New Brunswick	9.4	9.3	-0.1
Nova Scotia	9.5	10.8	1.3
Prince Edward Island	7.8	8.7	0.9

Motor Vehicle Markets

New Vehicle Sales

WardsAuto 10 Best-Selling U.S. Cars and Trucks

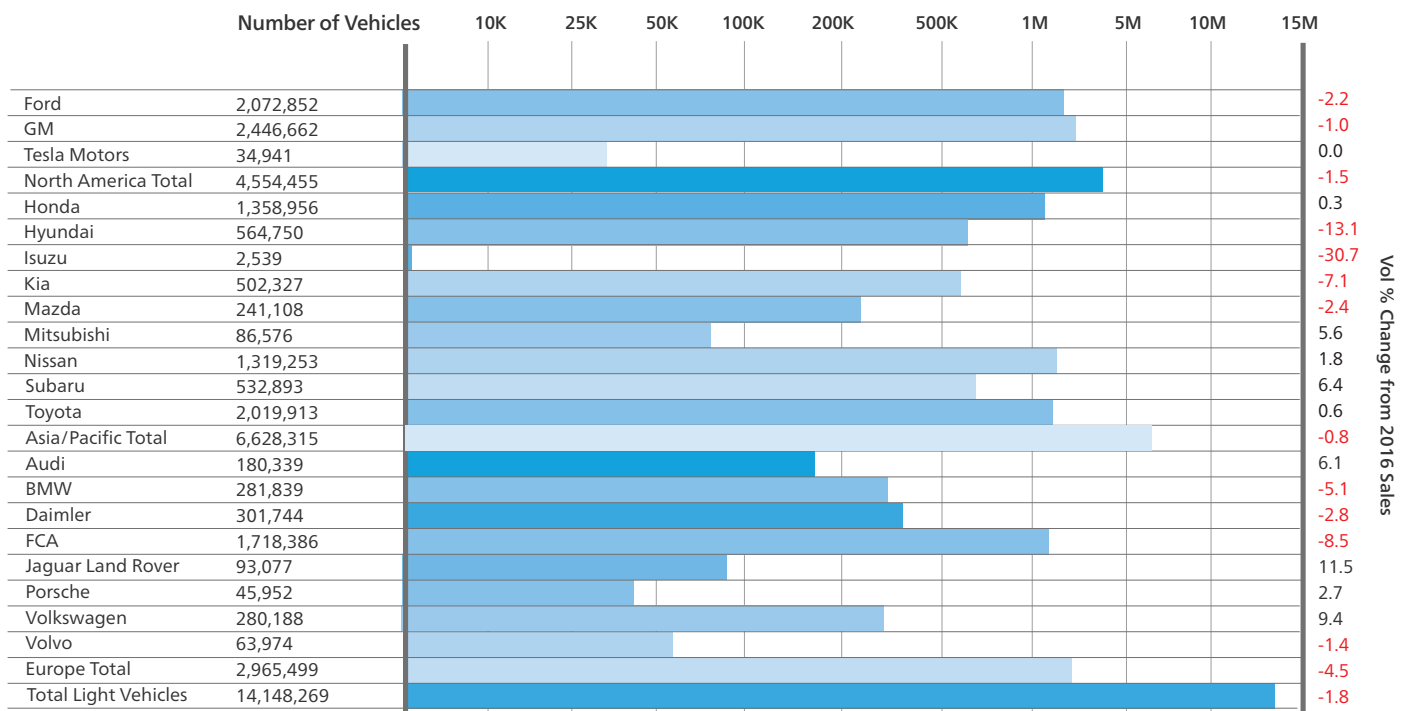
As of October 2017

Cars		Trucks/Vans/SUVs	
Civic	314,699	F-Series	683,377
Camry	308,759	Silverado	471,747
Accord	277,542	Ram Pickup	404,977
Corolla	272,299	RAV4	346,316
Altima	217,724	Rogue	327,213
Sentra	184,052	CR-V	308,706
Fusion	177,278	Escape	256,942
Cruze	160,363	Equinox	238,007
Elantra	157,800	Explorer	218,455
Malibu	155,809	Grand Cherokee	198,460

Source: WardsAuto InfoBank

WardsAuto U.S. Light Vehicle Sales by Company

October 2017



Light vehicles are cars and light trucks (GVW Classes 1-3, under 14,001 lbs.). DSR is daily sales rate. Tesla Motors monthly sales estimated.
Source: WardsAuto InfoBank

Current Used Vehicle Market Conditions

October 2017
Kontos Commentary

By Tom Kontos

Executive Vice President,
ADESA Analytical Services

The following commentary is produced monthly by Tom Kontos, Executive Vice-President, ADESA Analytical Services. ADESA is a leading provider of wholesale used vehicle auctions and ancillary remarketing services.

As part of the KAR Auction Services family, ADESA works in collaboration with its sister company, Insurance Auto Auctions, a leading salvage auto auction company, to provide insights, trends and highlights of the entire automotive auction industry.

Wholesale Used Vehicle Price Trends

	Average Prices (\$/Unit)			Latest Month Versus	
	Sept-17	Aug-17	Sept-16	Prior Month	Prior Year
Total All Vehicles	\$11,046	\$10,947	\$10,731	0.9%	2.9%
Total Cars	\$8,777	\$8,732	\$8,663	0.5%	1.3%
Compact Car	\$6,682	\$6,624	\$6,495	0.9%	2.9%
Midsize Car	\$7,785	\$7,639	\$7,518	1.9%	3.6%
Fullsize Car	\$7,243	\$7,063	\$7,608	2.5%	-4.8%
Luxury Car	\$14,007	\$14,003	\$13,769	0.0%	1.7%
Sporty Car	\$13,930	\$13,903	\$13,353	0.2%	4.3%
Total Trucks	\$13,182	\$13,036	\$12,735	1.1%	3.5%
Mini Van	\$9,059	\$8,777	\$8,383	3.2%	8.1%
Fullsize Van	\$13,159	\$12,317	\$13,587	6.8%	-3.1%
Compact SUV/CUV	\$10,673	\$10,468	\$10,525	2.0%	1.4%
Midsize SUV/CUV	\$11,430	\$11,407	\$11,655	0.2%	-1.9%
Fullsize SUV/CUV	\$13,740	\$13,353	\$13,255	2.9%	3.7%
Luxury SUV/CUV	\$19,205	\$18,947	\$18,591	1.4%	3.3%
Compact Pickup	\$9,591	\$9,599	\$8,608	-0.1%	11.4%
Fullsize Pickup	\$16,964	\$16,989	\$15,878	-0.2%	6.8%

Source: ADESA Analytical Services. May data revised.

Summary

Average wholesale prices in October were down only modestly month-over-month and were up year-over-year, bolstered by lingering impacts from hurricanes Harvey and Irma.

Details

According to ADESA Analytical Services' monthly analysis of Wholesale Used Vehicle Prices by Vehicle Model Class¹, wholesale used vehicle prices in October averaged \$10,977—down 0.6% compared to September and up 4.2% relative to October 2016. Prices were flat or down on a month-over-month basis for all model class segments, but were up year-over-year for all but fullsize cars.

Prices were up on an annual basis even when holding constant for sale type, model-year age, mileage, and model class segment, as seen in the following table:

Strong truck demand in Texas in the aftermath of Harvey may be a contributing factor to the strength of Midsize SUV/CUV prices.

Average wholesale prices for used vehicles remarketed by manufacturers were up 0.6% month-over-month and up 5.7% year-over-year. Prices for fleet/lease consignors were down 1.6% sequentially but up 4.5% annually. Average prices for dealer consignors were down 0.3% versus September and up 7.5% relative to October 2016.

October CPO sales were down 9.8% from the prior month and down 3.3% year-over-year, but are up 0.6% on a year-to-date basis, according to figures from Autodata.

Fleet/Lease Sales of Three-MY-Old Units w/36k-45k Miles				
	Average Prices		Y/Y	Y/Y
Model Class	Oct-17	Oct-16	\$	%
Midsize Car	\$11,321	\$11,141	\$180	1.6%
Midsize SUV/CUV	\$18,787	\$17,776	\$1,010	5.7%

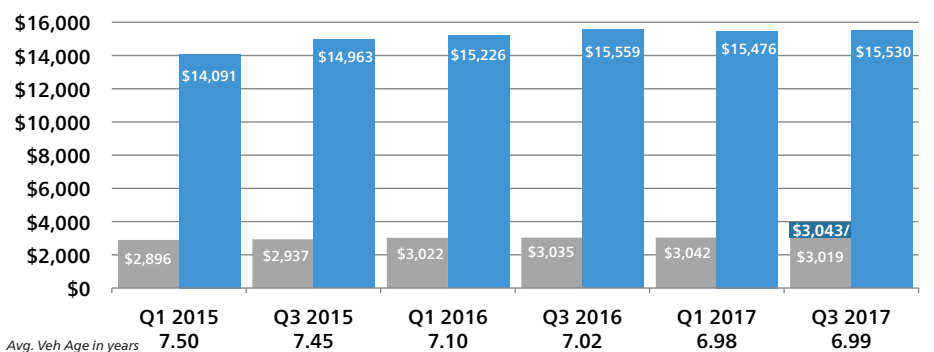
¹The analysis is based on over seven million annual sales transactions from over 150 of the largest U.S. wholesale auto auctions, including those of ADESA as well as other auction companies. ADESA Analytical Services segregates these transactions to study trends by vehicle model class, sale type, model year, etc. The views and analysis provided herein relate to the vehicle remarketing industry as a whole and may not relate directly to KAR Auction Services, Inc. The views and analysis are not the views of KAR Auction Services, its management or its subsidiaries; and their accuracy is not warranted. The statements contained in this report and statements that the company may make orally in connection with this report that are not historical facts are forward-looking statements. Words such as "should," "may," "will," "anticipates," "expects," "intends," "plans," "believes," "seeks," "estimates," "bode," "promises," "likely to" and similar expressions identify forward-looking statements. Forward-looking statements are subject to risks and uncertainties that could cause actual results to differ materially from the results projected, expressed or implied by the forward-looking statements. Factors that could cause or contribute to such differences include those matters disclosed in the company's Securities and Exchange Commission filings. The company does not undertake any obligation to update any forward-looking statements.

Mitchell Collision Repair Industry Data

Appraisal Values

The initial average appraisal value, calculated by combining data from all first and third-party repairable vehicle appraisals uploaded through Mitchell systems in Q3 2017, was \$3,019, \$16 less than this same period last year. However, continued development suggests a final Q3 2017 average appraisal value of \$3,043, which represents an increase over the same quarter last year.

Average Appraisal Values, ACVs and Age All APD Line Coverages*



* Values provided from Guidebook benchmark averages, furnished through Ultramate.

Comprehensive Losses

In Q3 2017, the average initial gross appraisal value for comprehensive coverage estimates processed through our servers was \$3,104, compared to \$3,387 in Q3 2016. Factoring for development produces an increase in the adjusted value to \$3,134.



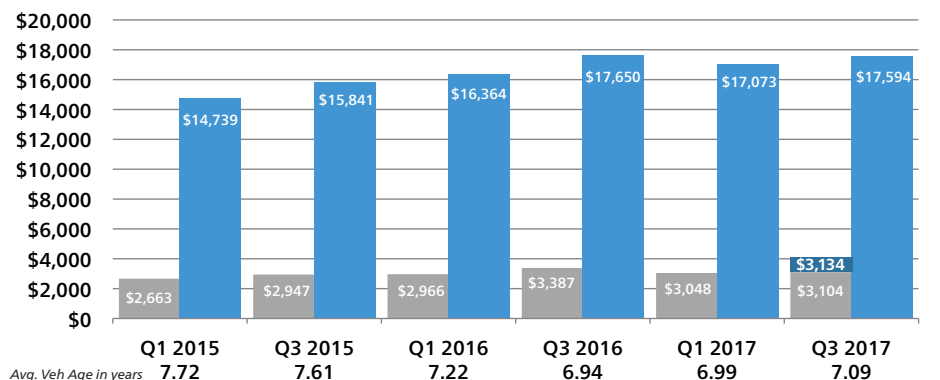
MITCHELL SOLUTION:

Mitchell Cloud Estimating

Mitchell Cloud Estimating is the industry's first truly cloud based platform, utilizing the latest technology to deliver innovative solutions to market faster than ever, to solve the needs of the estimators of today and tomorrow. Using Mitchell's proprietary technology, this app simplifies the estimating process, letting you focus on proper and safe repairs and achieve effective business outcomes.

Visit Mitchell's website at www.mitchell.com/cloud-estimating

Average Appraisal Values, ACVs and Age Comprehensive Losses*



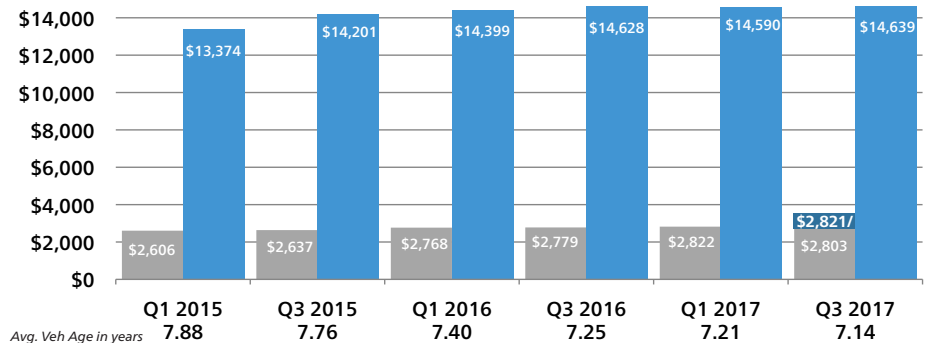
* Values provided from Guidebook benchmark averages, furnished through Mitchell Estimating.

Mitchell Collision Repair Industry Data

Third-Party Property Damage

In Q3 2017, our initial average gross third-party property damage appraisal was \$2,803 compared to \$2,779 in Q3 2016, reflecting a \$24 initial increase between these respective periods. Factoring for development yields an anticipated Q3 2017 adjusted appraisal value of \$ 2,821, a \$42 increase in average severity over Q3 2016.

Average Appraisal Values, ACVs and Age Auto Physical Damage*



* Values provided from Guidebook benchmark averages, furnished through Ultramate.

Appraisals ACV's

Collision Losses

Mitchell's Q3 2017 data reflects an initial average gross collision appraisal value of \$3,282, \$4 less than the same period last year. Continued development suggests a final Q3 2017 average gross collision appraisal value of \$3,311, \$25 higher compared to the same quarter last year.



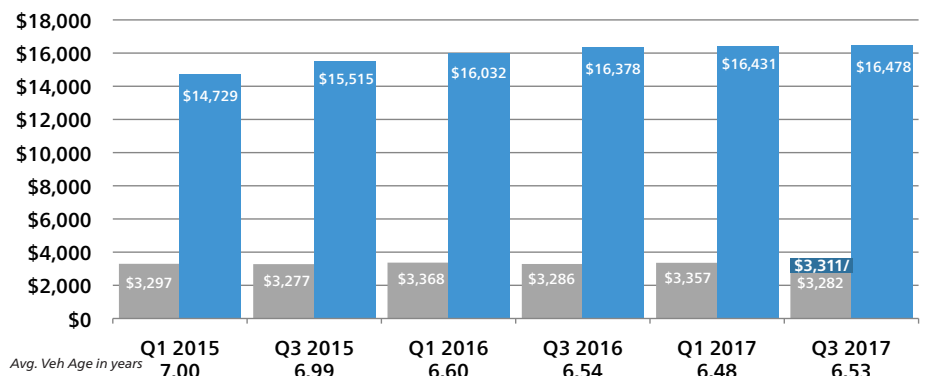
MITCHELL SOLUTION:

Mitchell QRP™

Mitchell's Quality Recycled Parts (QRP) program is the most comprehensive source for finding recycled parts, providing online access to a parts database compiled from a growing network of more than 800 of the highest quality recyclers in North America and Canada. QRP is fully integrated with UltraMate / UltraMate Premier Suite for total ease-of-use.

For more information on QRP, visit Mitchell's website at www.mitchell.com

Average Appraisal Values, and Age Collision Coverage*



* Values provided from Guidebook benchmark averages, furnished through Mitchell Estimating.

Appraisals ACV's

Mitchell Collision Repair Industry Data

Supplements

EDITOR'S NOTE

As it generally takes at least three months following the original date of appraisal to accumulate most supplements against an original estimate of repair, we report (and recommend viewing supplement information) three months' after-the-fact to obtain the most accurate view of this data.

In Q3 2017, 38.82% of all original estimates prepared by Mitchell-equipped estimators were supplemented one or more times. In this same period, the pure supplement frequency (supplements to estimates) was 60.38%, reflecting a 2.37 point increase from that same period in 2016. The average combined supplement variance for this quarter was \$893.24, \$4.36 higher than in Q3 2016.

Average Supplement Frequency and Severity

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt. Change	% Change
% Est. Supplement	36.78	34.71	40.63	39.88	42.03	38.82	-1.06	-3%
% Supplement	52.93	50.11	62.17	58.01	64.95	60.38	2.37	4%
Avg. Combined Supp. Variance \$	817.79	873.18	871.59	888.88	899.55	893.24	4.36	0%
% Supplement \$	28.24	29.73	28.84	29.29	29.57	29.58	0.29	1%

Average Appraisal Make-Up

This chart compares the average appraisal make-up as a percentage of dollars, constructed by Mitchell-equipped estimators. These data points reflect a 'trade off'; in comparing Q3 2017 to the same period last year, there was only minimal shifting between categories.

% Average Appraisal Dollars by Type

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt. Change	% Change
% Average Part \$	45.76	43.72	45.49	43.73	45.65	44.07	0.34	0.78%
% Average Labor \$	42.77	44.99	43.17	45.01	43.02	44.68	-0.33	-0.73%
% Paint Material \$	10.45	10.5	10.24	10.12	10.1	10.28	0.16	1.58%

Parts Analysis

Parts Type Definitions

Original Equipment Manufacturer (OEM):

Parts produced directly by the vehicle manufacturer or their authorized supplier, and delivered through the manufacturer's designated and approved supply channels. This category covers all automotive parts, including sheet metal and mechanical parts.

Aftermarket:

Parts produced and/or supplied by firms other than the Original Equipment Manufacturer's designated supply channel. This may also include those parts originally manufactured by endorsed OEM suppliers, which have later followed alternative distribution and sales processes. While this part category is often only associated with crash replacement parts, the automotive aftermarket also includes a large variety of mechanical and custom parts.

Non-New/Remanufactured:

Parts removed from an existing vehicle that are cleaned, inspected, repaired and/or rebuilt, usually back to the original equipment manufacturer's specifications, and re-marketed through either the OEM or alternative supply chains. While commonly associated with mechanical hard parts such as alternators, starters and engines, remanufactured parts may also include select crash parts such as urethane and TPO bumpers, radiators and wheels.

Recycled:

Parts removed from a salvaged vehicle and re-marketed through private or consolidated auto parts recyclers. This category commonly includes all types of parts and assemblies, especially body, interior and mechanical parts.

EDITOR'S NOTE

While there isn't a perfect correlation between the types of parts specified by estimators and those actually used during the course of repairs, we feel that the following observations are directionally accurate for both the insurance and auto body repair industries. This section illustrates the percentage of dollars allocated to each unique part-type.

As a general observation, recent data show that parts make up 46% of the average value per repairable vehicle appraisal, which represents over \$1,400 in average spend per estimate.



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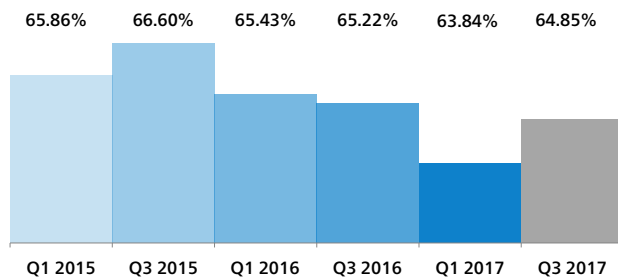
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Mitchell Collision Repair Industry Data

Original Equipment Manufacturer (OEM) Parts Use in Dollars

In Q3 2017, OEM parts represented 64.85% of all parts dollars specified by Mitchell-equipped estimators. This represents a decrease of 0.37 points from Q3 2016.

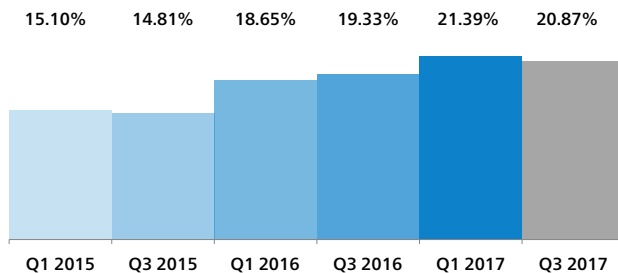
Parts-New



Aftermarket Parts Use in Dollars

In Q3 2017, 20.87% of all parts dollars recorded on Mitchell appraisals were attributed to Aftermarket sources, up 1.54 points from Q3 2016.

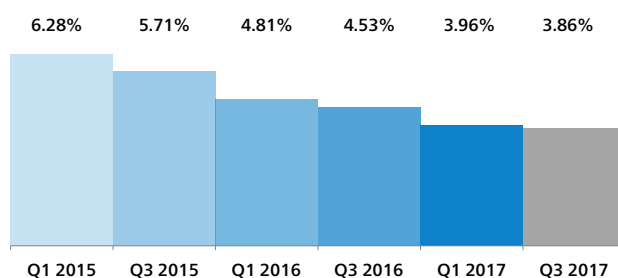
Parts-Aftermarket



Remanufactured Parts Use in Dollars

Listed as "Non-New" parts in our estimating platform and reporting products, Remanufactured parts represent 3.86% of the average gross parts dollars used in Mitchell appraisals during Q3 2017. This reflects a decrease of 0.67 points compared to the same period in 2016.

Parts-Remanufactured



MITCHELL SOLUTION:

Mitchell MAPP™

Mitchell Alternate Parts Program (MAPP) offers automated access to nearly 100 Remanufactured and Aftermarket part types from over 700 suppliers ensuring shops get the parts they need from their preferred vendors. MAPP is fully integrated with UltraMate / UltraMate Premier Suite for total ease-of-use.

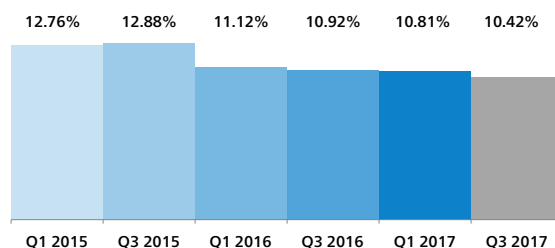
For more information on MAPP, visit Mitchell's website at www.mitchell.com

Mitchell Collision Repair Industry Data

Recycled Parts Use in Dollars

Recycled parts constituted 10.42% of the average parts dollars used per appraisal during Q3 2017, reflecting a 0.5% decrease from Q3 2016.

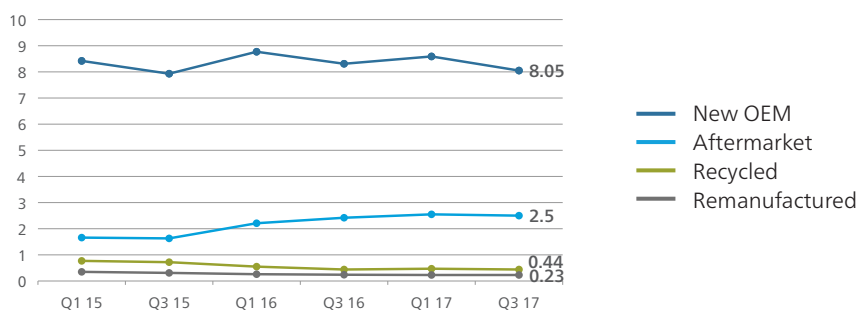
Parts-Recycled



The Number of Parts by Part Type

In order to capture another aspect of parts use, we calculate the number of parts used by part type on a repairable estimate. In comparing Q3 2017 to the same quarter in 2016, aftermarket parts usage increased to an average 2.5 parts per estimate. At the same time, new OEM and Remanufactured parts usage decreased, while recycled parts usage remained flat.

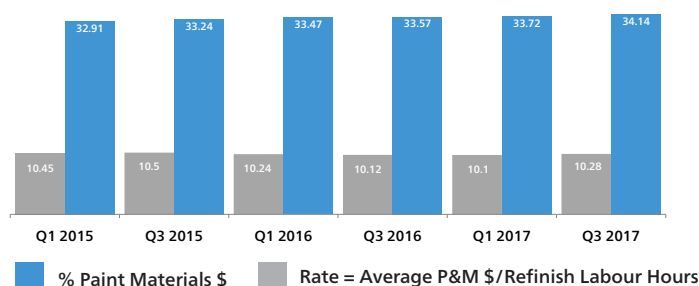
Number of Parts by Part Type



Paint and Materials

During Q3 2017, Paint and Materials made up 10.28% of our average appraisal value, representing a 0.16% relative increase from Q3 2016. Represented differently, the average paint and materials rate—achieved by dividing the average paint and materials allowance per estimate by the average estimate refinish hours—yielded a rate of \$34.14 per refinish hour in this period, compared to \$33.57 in Q3 2016.

Paint And Materials, By Quarter



MITCHELL SOLUTION: Mitchell RMC™

Mitchell's Refinishing Materials Calculator (RMC) provides accurate calculations for refinishing materials costs by incorporating a database of more than 8,500 paint codes from eight paint manufacturers. It provides job-specific materials costing according to color and type of paint, plus access to the only automated, accurate, field-tested, and industry-accepted breakdown of actual costs of primers, colors, clear coats, additives and other materials needed to restore vehicles to pre-accident condition.

For more information on RMC, visit Mitchell's website at www.mitchell.com

Mitchell Collision Repair Industry Data

Adjustments

In Q3 2017, the percentage of adjustments made to estimates was down compared to the same period last year. The frequency of betterment taken decreased by 9%, while the average dollar amount of the betterment taken dropped by 2% to \$140.78. Appearance allowance frequency also dropped by 8%, while the dollar amount of that appearance allowance increased to \$231.98.

Adjustment \$ and %s

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt/\$ Change	% Change
% Adjustments Est	2.95	2.96	3.03	2.99	2.82	2.72	-0.27	-9%
% Betterment Est	2.4	2.39	2.37	2.26	2.14	2.05	-0.21	-9%
% Appear Allow Est	0.43	0.44	0.52	0.53	0.55	0.49	-0.04	-8%
% Prior Damage Est	2.87	2.87	2.51	2.36	2.21	2.21	-0.15	-6%
Avg. Betterment \$	124.21	128.96	132.18	143.34	128.56	140.78	-2.56	-2%
Avg. Appear Allow \$	210.71	213.81	221.46	225.7	213.33	231.98	6.28	3%

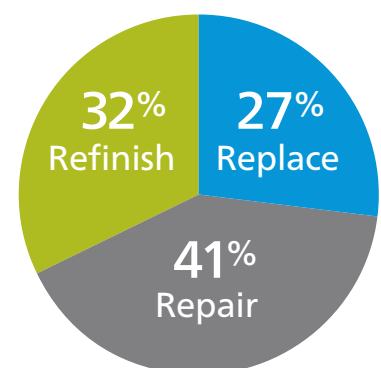
Labor Analysis

For 2017 year-to-date, average body labor rates rose in all the survey states compared to 2016.

Average Body Labor Rates and Change by State

	2016	2017 YTD	\$ Change	% Change
Arizona	51.09	51.46	\$ 0.37	1%
California	55.49	56.75	\$ 1.26	2%
Florida	42.94	43.5	\$ 0.56	1%
Hawaii	50.24	51.36	\$ 1.12	2%
Illinois	51.98	52.16	\$ 0.18	0%
Michigan	46.27	46.67	\$ 0.40	1%
New Jersey	47.84	48.04	\$ 0.20	0%
New York	49.07	49.33	\$ 0.26	1%
Ohio	46	47.9	\$ 1.90	4%
Rhode Island	45.96	46.81	\$ 0.85	2%
Texas	45.74	46.11	\$ 0.37	1%

Percent of average labor hours by type



Total Loss

The chart below illustrates the total loss data for both vehicle age and actual cash value of total loss vehicles processed through Mitchell servers.

Average Vehicle Age in Years

Vehicles	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17
	Average Vehicle Age in Years					
Convertible	12.71	13.01	12.7	13.05	12.95	13.59
Coupe	12.02	12.37	12.1	12.35	12.2	12.42
Hatchback	8.26	8.18	8	8.06	8.25	8.19
Sedan	10.37	10.43	10.19	10.29	10.41	10.37
Wagon	10.1	10.42	10.65	10.82	10.94	11.24
Other Passenger	12.02	12.82	10.99	7.14	3.87	4.47
Pickup	12.41	12.96	12.92	13.09	13.5	13.44
Van	11.37	11.57	11.55	11.74	11.84	11.83
SUV	10.42	10.42	10.36	10.37	10.66	10.61

Average Vehicle Total Loss Actual Cash Value

Vehicles	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17
	Average Actual Cash Value					
Convertible	9,507.76	10,292.54	9,931.11	10,088.09	9,582.95	10,263.87
Coupe	7,497.37	7,974.89	8,032.50	8,080.73	7,737.34	8,279.80
Hatchback	8,208.48	8,740.67	8,534.83	8,311.45	7,621.95	7,698.65
Sedan	7,426.76	7,931.41	7,691.77	7,646.78	7,233.98	7,294.73
Wagon	6,623.72	6,833.21	6,699.17	6,571.12	6,343.90	6,401.37
Other Passenger	16,196.74	15,170.59	19,673.40	18,408.88	19,084.11	18,172.28
Pickup	10,868.37	11,124.16	11,662.25	11,969.94	11,425.11	12,058.91
Van	5,994.83	6,448.19	6,450.06	6,763.43	6,462.68	6,843.54
SUV	9,301.24	10,086.55	10,076.09	10,244.19	9,687.56	9,901.25



MITCHELL SOLUTION:

Mitchell WorkCenter™ Total Loss

Mitchell WorkCenter™ Total Loss gives your claims organization a statistically-driven, fully-automated, web-based total loss valuation system that generates fair, market-driven values for loss vehicles. It combines J.D. Power and Associates' data analysis and pricing techniques with Mitchell's recognized leadership in physical damage claims processing solutions. Mitchell WorkCenter™ Total Loss helps you reduce settlement time and improve customer satisfaction.

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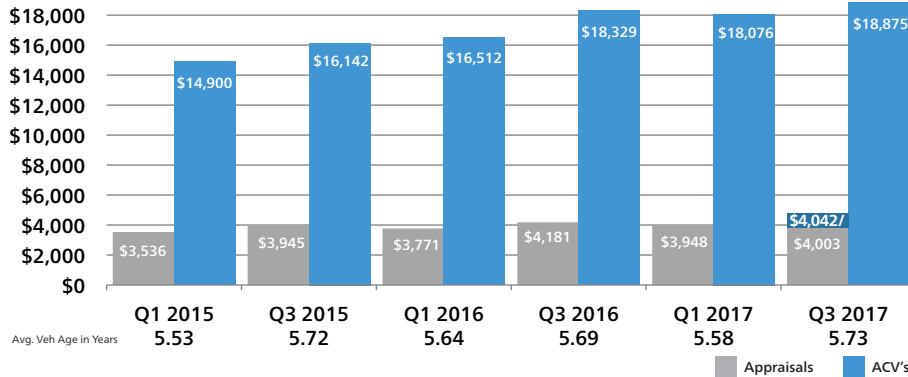


Canadian Collision Summary

Canadian Appraisal Severity

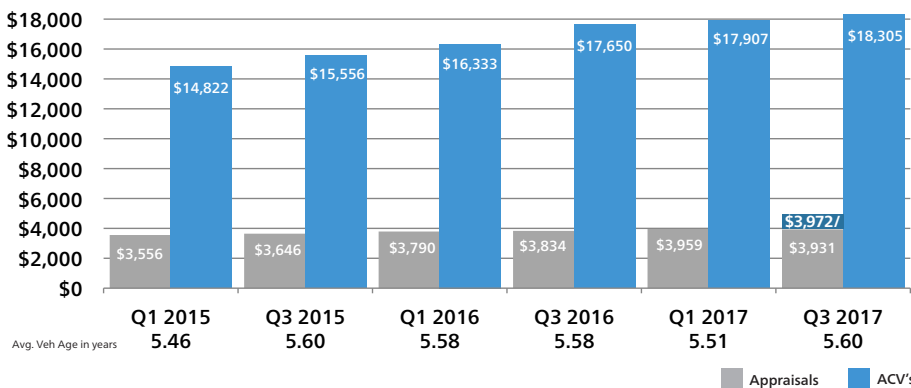
Average Appraisal Values Severity Overall

The average gross initial appraisal value, calculated by combining data from all first and third party repairable vehicle appraisals uploaded through Mitchell Canadian systems in Q3 2017, was \$4,003 - a \$178 decrease from Q3 2016. Factoring for development yields an anticipated increase to \$4,042



Collision Losses

The average initial gross collision appraisal value uploaded through Mitchell Canadian systems in Q3 2017 was \$3,931, a \$97 increase from Q3 2016. Factoring for development yields an anticipated increase to \$3,972, which represents a \$138 increase from Q3 2016.



Canadian Average Appraisal Make-Up

This chart compares the average appraisal make up as a percentage of dollars. These data points reflect an increase in parts and decrease in labor when comparing Q3 2017 results to the same period last year.

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt/\$ Change	% Change
% Average Part \$	46.18	39.16	46.27	38.22	47.84	44.08	5.86	15%
% Average Labour \$	42.36	49.42	42.24	50.58	40.8	45.13	-5.45	-11%
% Paint Material \$	8.42	8.07	8.31	7.88	8.11	8.15	0.27	3%

CANADA SEGMENT

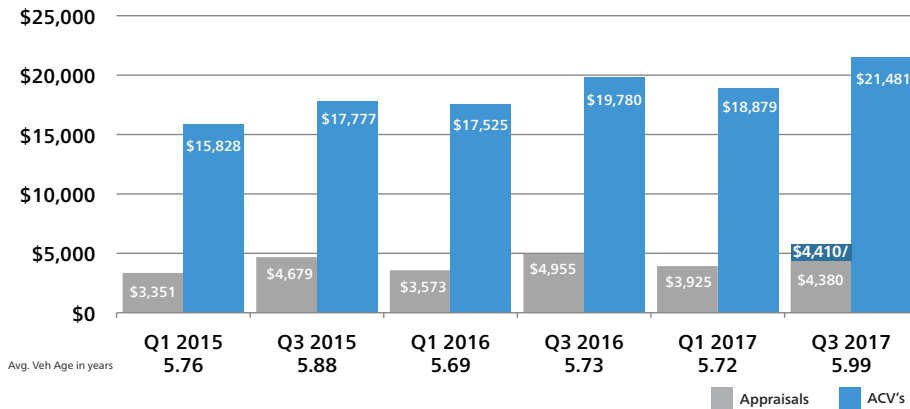
All dollar-figures appearing in this section are in CDN\$. This data is the product of upload activity from body shops, independent appraisers, and insurance personnel, more accurately depicting insurance-paid loss activity, rather than consumer direct or retail market pricing.

Canadian Collision Summary



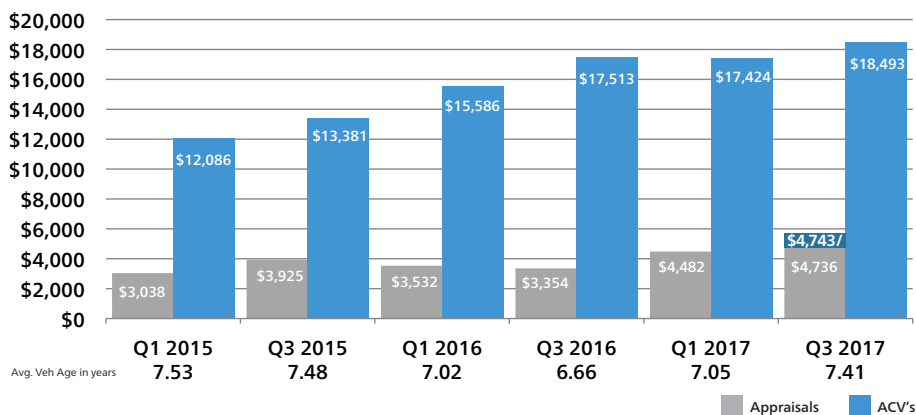
Comprehensive Losses

In Q3 2017, the average initial gross Canadian appraisal value for comprehensive coverage estimates processed through our servers was \$4,380, which represents a decrease of \$575 compared to Q3 2016. Factoring for development, the anticipated final average appraisal value will be \$4,410.



Third-Party Property Damage

In Q3 2017, our Canadian industry initial average gross third-party property damage appraisal was \$4,736, which represents an increase of \$1,382 from Q3 2016. Factoring for development, we anticipate a final value of \$4,743.



Canadian Supplements

In Q3 2017, 45.97% of all original estimates prepared by Mitchell-equipped Canadian estimators were supplemented one or more times. In this same period, the pure supplement frequency (supplements to estimates) was 66.21%. The average combined supplement variance for this quarter was \$933.64, \$72.43 lower compared to Q3 2016.

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt/\$ Change	% Change
% Est Supplements	52.17	49.26	55.04	45.42	51.79	45.97	0.55	1%
% Supplements	75.51	67.37	88.75	60.92	78.58	66.21	5.29	9%
Avg Combined Supp Variance	777.75	819.49	821.32	1,006.07	950.96	933.64	-72.43	-7%
% Supplement \$	22	20.77	21.78	24.06	24.09	23.32	-0.74	-3%

Canadian Collision Summary



Canadian Adjustments

In Q3 2017, the average frequency of betterment taken on estimates decreased by 33%, while the dollar amount of that betterment increased by 22%. Appearance allowances were also down, and the dollar amount of those allowances decreased by 10% when compared to Q3 2016.

Date	Q1/15	Q3/15	Q1/16	Q3/16	Q1/17	Q3/17	Pt/\$ Change	% Change
% Adjustments Est	1.56	2.52	1.72	2.53	1.47	1.73	-0.8	-32%
% Betterment Est	1.34	2.17	1.43	2.15	1.27	1.44	-0.71	-33%
% Appear Allow Est	0.21	0.34	0.26	0.39	0.2	0.31	-0.08	-21%
% Prior Damage Est	0.15	0.22	0.24	0.23	0.23	0.21	-0.02	-9%
Avg. Betterment \$	235.15	289.84	335.19	344.86	402.63	421.37	76.51	22%
Avg. Appear Allow \$	231.37	284.4	274.04	392.26	317.13	354.69	-37.57	-10%

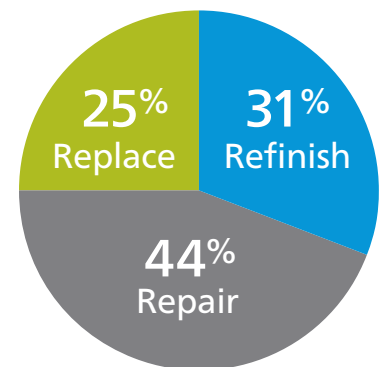
Canadian Labour Analysis

This data reflects the percentage of labor dollars utilized in the creation of Mitchell appraisals by Canadian estimators.

Average Body Labour Rates and Change by Province

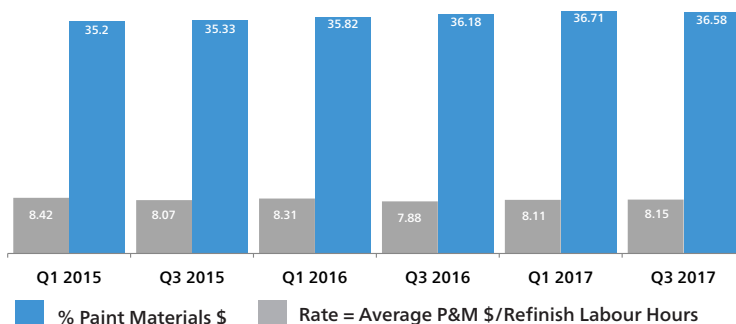
Province	2016	YTD 2017	\$ Change	% Change
Alberta	76.17	75.29	\$(0.88)	-1%
Newfoundland & Labrador	63.23	64.6	\$1.37	2%
Northwest Territories	93.48	93.38	\$(0.10)	0%
Nova Scotia	59.51	59.99	\$0.48	1%
Ontario	57.59	57.98	\$0.39	1%
Quebec	52.7	54.06	\$1.36	3%
Yukon Territory	95.58	95.51	\$(0.07)	0%

Labour Operations



Canadian Paint and Materials

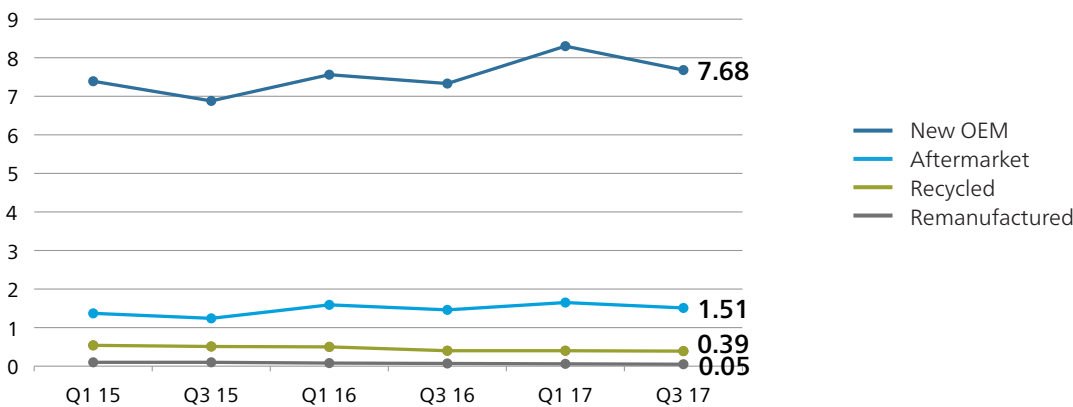
For Q3 2017, Paint and Materials made up 8.15% of our average appraisal value. Represented differently, the average paint and materials rate was \$36.58 per hour.





Canadian Collision Summary

Canadian Number of Parts by Part Type



Canadian Parts Utilization

All data reflects the percentage of part-type dollars utilized in the construction of Mitchell appraisals by Canadian estimators.

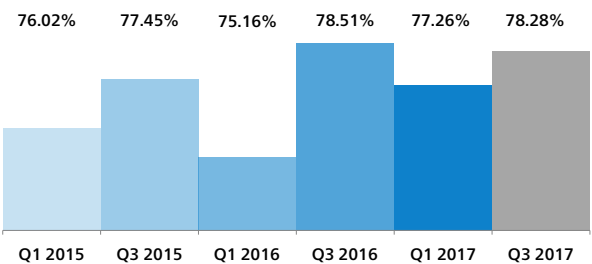
Original Equipment Manufacturer (OEM) Parts Use in Dollars

In Q3 2017, OEM parts use decreased slightly compared to Q3 2016.

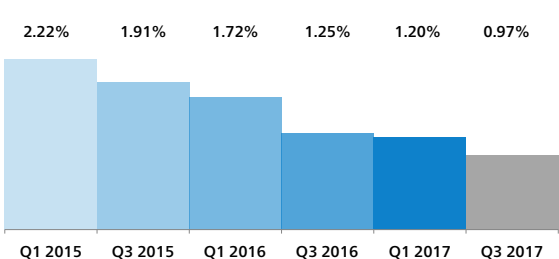
Remanufactured Parts Use in Dollars

Remanufactured parts use in Canada dropped to 0.97% for Q3 2017, which represents the lowest percentage of part dollars in the charted quarters.

Parts-New



Parts-Non-New



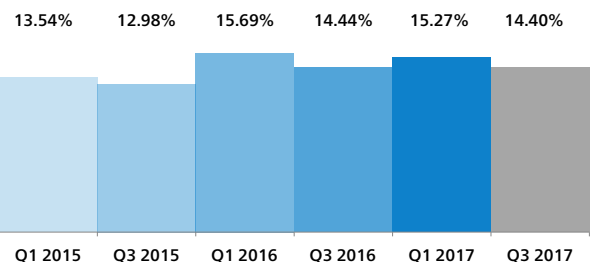
Aftermarket Parts Use in Dollars

Aftermarket parts use in Q3 2017 decreased slightly compared to the same period last year, coming in at 14.4%.

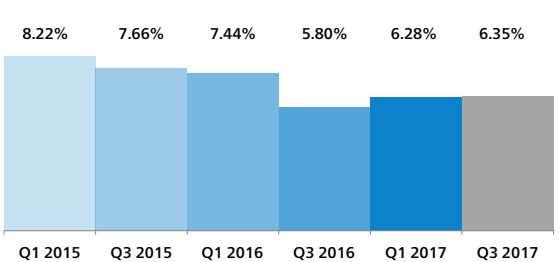
Recycled Parts Use in Dollars

In Q3 2017, recycled parts use in Canada increased compared to Q3 2016 results.

Parts-Aftermarket



Parts-Recycled



About Mitchell



Mitchell San Diego Headquarters | 6220 Greenwich Dr. | San Diego, CA 92122

Mitchell empowers clients to achieve measurably better outcomes. Providing unparalleled breadth of technology, connectivity and information solutions to the Property & Casualty claims and Collision Repair industries, Mitchell is uniquely able to simplify and accelerate the claims management and collision repair processes.

As a leading provider of Property & Casualty claims technology solutions, Mitchell processes over 50 million transactions

annually for over 300 insurance companies/ claims payers and over 30,000 collision repair facilities throughout North America. Founded in 1946, Mitchell is headquartered in San Diego, California, and has approximately 2,000 employees. The company is privately owned primarily by KKR, a leading global investment firm.

For more information on Mitchell, visit www.mitchell.com.

The Industry Trends Report is a quarterly snapshot of the auto physical damage collision and casualty industries. Just inside—the economy, industry highlights, plus illuminating statistics and more. Stay informed of ongoing and emerging trends impacting the industry, and you, with the Industry Trends Report!

Questions or comments about the Industry Trends Report may be directed to:





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Kontos Commentary is produced monthly by Tom Kontos, Executive Vice-President, ADESA Analytical Services. ADESA is a leading provider of wholesale used vehicle auctions and ancillary remarketing services. As part of the KAR Auction Services family, ADESA works in collaboration with its sister company, Insurance Auto Auctions, a leading salvage auto auction company, to provide insights, trends and highlights of the entire automotive auction industry. For more information about Enterprise Rent-A-Car Average Length of Rental and to access your market and shop numbers please contact daniel.friedman@ehi.com.

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