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Welcome to the Clean Cab Supplement

As departments look for methods to combat firefighter cancer, it was determined that crews spend a lot of time in the cabs of the apparatus while responding to and returning from incidents, traveling to training and taking part in other activities in the community. Being inside the cab, however, increases the amount of times firefighters are exposed to harmful carcinogens, whether they are airborne or from having contact with dirty PPE and equipment on the firefighter's skin. With these findings, the idea of the clean cab concept was born.

Manufacturers—from apparatus and seats to equipment mounting and SCBA—have worked with engineers to find ways to keep the cab as clean as possible. Some departments are starting to store their PPE and SCBA in compartments after fires to reduce contact with firefighters after a fire.

Firehouse Magazine is proud to present this Clean Cab supplement, which looks at what fire departments can do starting today to keep their cabs clear from dangerous contaminants. Even with gross decon at fire scenes, equipment can still absorb and carry carcinogens and our team wanted to share the most up-to-date best practices to reduce exposures.

Every apparatus can carry a bucket filled with a cleaning solution, scrub brush, and hose to clean the cab interior and then wash it down to remove and minimize contaminants.

Apparatus and component manufacturers are working diligently with their teams to develop their own clean cab concepts for new apparatus, plus developing options for retrofits for vehicles that are already on the front line. We recommend you ask your local representatives or manufacturers at the next trade show you attend or contact them directly for more information.

Stay safe,
Peter Matthews
Editor-in-Chief/Conference Director

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The Clean Cab Concept is Alive and Well

Health concerns about contaminated gear drive the movement

The clean cab concept is a moving target that frequently ends up being a slippery slope for all involved. We all know that firefighting is obviously a dangerous career. More recently, firefighter cancer prevention has become a major topic including awareness of the different types of carcinogen exposure. In the past, it was a badge of honor to have dirty, smoky gear. We never thought about the major effects the toxic chemicals and smoke would cause, including the rise in cancer in the fire service that is reported today.



CLEAN CAB

Many agencies still have all their PPE and SCBA in the cab. Their reasons for not moving them out of the cab range from perceived potential delays with response on-scene time and a “that’s the way we have always done it” mentality, to limited finances and resources as well as varying operational cultures.

On the other hand, many agencies *have* removed all the PPE and SCBA out of the cab and into separate compartments. The various agencies that chose to remove these items report the 15–20 seconds does not alter on-scene time. This also allows the crew to get out safely, exit the vehicle without the extra weight and don their gear while allowing everyone on that rig to collectively strategize at the same time. This also helps to prevent ankle, knee and back injuries, ultimately lowering on-the-job injuries and injury rehab time.

Back in-service times

Deconning on scene and after a fire has turned into another challenge. Based on the data I’ve seen and collected, it takes the crew at least twice as long to return back to service after the deconning and bagging of their gear, replacing the gear, and SCBA cleaning—including replacing the straps, cleaning the bottles, pack frames, masks, tools, hose and more.

During my research, I reached out to many departments looking for average “back in-service” times after firefighting contamination exposure with gross decontamination on scene.

Below is the generally accepted process:

- Contaminated firefighters perform gross decontamination on scene prior to removal of their SCBA and facepiece. Firefighters will clean and rinse off exposed protective clothing with the scrub brush and soapy water. Helmet, facepiece,

coat, pants, boots, gloves, SCBA and exposed equipment will be cleaned.

- At the completion of fireground activities, firefighters will bag and zip-tie closed all contaminated PPE prior to returning to quarters. Transport of exposed PPE, tools and hoses back to quarters should be by utility vehicle or on tailboards, walkthrough or hosebed, if it can be properly secured. The crew compartment should be avoided.
- Crews that have contaminated gear will remain out of service until their second set of gear is placed in-service on the apparatus.
- Members will then shower.
- Recommended shower process consists of a thorough rinse, soap-up from head to toe, rinse and repeat two times.
- Units can then be placed in service.

While the focus on the clean cab concept is with the PPE and SCBA being carried in the cab with the



Photos courtesy of Brian Brown

CLEAN CAB

firefighters, many agencies, including Los Angeles City and Los Angeles County, have been storing the SCBA in separate compartments outside of the cab for many years. Some departments have gone as far as having color-coded tools and equipment, which now means one color for any firefighting activities and the other color for non-fire calls and activities.

Because of the growth in population, congestion and narrower streets that most departments are experiencing today, however, many agencies are moving to make their fire trucks shorter and smaller. This creates a challenge to find separate compartments for SCBA, PPE, additional tools and equipment. This causes a domino effect of building more

compartments while attempting to reduce the footprint of the truck.

Structural vs. wildland

One area of firefighting that I believe has been overlooked when it comes to the clean cab concept is the wildland firefighter. Obviously, there is smoke where wildland firefighters work. Curiously, few studies and literature quantify the effects on the health of these firefighters. One study published in 2017 titled, "Wildland Fire Smoke Health Effects on Wildland Firefighters and the Public — Final Report to the Joint Fire Science Program," provides a preliminary analysis addressing the wildland smoke and the effects on the wildland firefighter.

Another reference is the NIOSH Study regarding the 1988 Yellowstone Fire. Listed are the particles the firefighters breathed in, captured on their gear and introduced into the wildland vehicle. These include:

- Aldehydes (volatile organic compounds)
- Sulfur dioxide (SO₂)
- Carbon monoxide (CO)
- Particulate matter
- Acrolein
- Benzene
- Crystalline silica (OSHA classified carcinogen)
- Intermediate chemicals
- Diesel exhaust (Group 1 carcinogen)

Don't forget about the fire retardant dropped by the tankers, which is also a type of carcinogen.

Knowing this, my hope is that we begin to take a broader look at the wildland side and then make the steps toward a cleaner, healthier cab and PPE concept for the wildland firefighter, the apparatus and the equipment essential to do their job.

EMS exposure

When a crew responds in an engine or aerial to an EMS call that includes the patient's blood, body fluids, urine, and more, what happens to the crew's gear afterward? According to two experienced firefighters I talked to, it goes

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Those battling wildland fires are exposed to a variety of harmful particles that are captured on their gear and introduced into the wildland vehicle.



right back in the cab. Is it deconned after the call? Rarely! In a typical scenario the crew could decide on the way back from the call to stop at the store to pick up dinner. The grocery bags then go in the cab, possibly on the gear, but a lot of times on the floor between the rear jump seats. Then the crew returns to the station and the grocery bags are carried out of the cab of the truck and into the kitchen or day room at the

firehouse and placed on the counter or maybe the dining room table. Is this scenario the same for the ambulance/medic?

This is a picture of very contaminated gear, cabs and living areas. On top of that, we then let the preschool and kindergarten classes tour the station and climb in and out of the engines, aerials and ambulance! We also let parents and kids “play” with

the bunker gear and take photos while standing in bunker pants, suspenders, coats, helmets, and holding the tools—axe and halogen, mostly. I am guilty of doing this with my own kids and grandkids.

Diesel exhaust

In my previous article, “Fire Apparatus & Cancer Prevention” found at firehouse.com/21028263, I mention die-

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sel exhaust contamination inside and outside the station, stating, “Apparatus vehicle exhaust, mainly diesel exhaust, is a carcinogen that could affect firefighter health, and efforts should be made to minimize exposure at all times.” Now with the clean cab concept this also includes the PPE storage in the station and deconning on scene. Going forward:

- All PPE on storage racks that have the potential to be exposed to exhaust contaminants should be protected by closing and zipping bunker coats and pants to prevent particulates from landing on and absorbing into the liners or stored in a separate room. However, when consulting with other departments, I still see exposed bunker gear hanging in gear lockers in the apparatus bays—unprotected.
- All crews and personnel should utilize the station exhaust systems and never let any apparatus/equipment

run within the bays unless absolutely necessary. In the unlikely event that need arises, the exhaust system hose shall always be in place and the apparatus shall not exceed idle speed. While I understand the finance and remodel effort it takes to have a diesel exhaust removal system put in a fire station, it is unbelievable to see a new station without it. Recently, a department in Florida did not see the need to install an exhaust removal system. Nor did they see the need to retrofit the trucks with filters to capture diesel exhaust while in or out of the station. The agency’s “fix” was to wall-mount large vents and fans on each end of the apparatus bay “up high” to bring in fresh air and exhaust the diesel fumes.

- When possible, apparatus that can be shut down should be shut down during any incident to further limit exposure to contaminants. Close windows and recirculate air instead

of utilizing fresh air inlets for air conditioning and heating to reduce smoke and contaminants from entering the crew cabs. Safety shall never be leveraged to meet this objective.

- Plastic seat covers have been provided for all apparatus and they shall be placed over all seats for the return trip to the fire station to prevent any contamination to the apparatus cab seats.
- No exhaust from any vehicle, gas or diesel, should expose bunker pants that are stored on the bay floor, most specifically the groin area of bunker pants and hoods typically placed on top of pants for call readiness. When possible, store gear within the apparatus to prevent contamination by exhaust.

As Chief Alan Brunacini once said, “Two things firefighters hate; the way things are now and change.” Get ready for change! While 100 percent mediation is not possible in avoiding

IF YOU’RE DRIVEN TO PROTECT LIVES, START WITH YOUR CREW.

Exposure to fire scene contaminants and toxins, as well as breathing in volatile organic compounds (VOCs), is making a dangerous job even more life-threatening for firefighters.

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Notice the congestion inside the cab. Without proper processes, we expose others to contaminants. Think about how often we let parents and kids “play” with the bunker gear and take photos while standing in bunker pants, suspenders, coats and helmets.

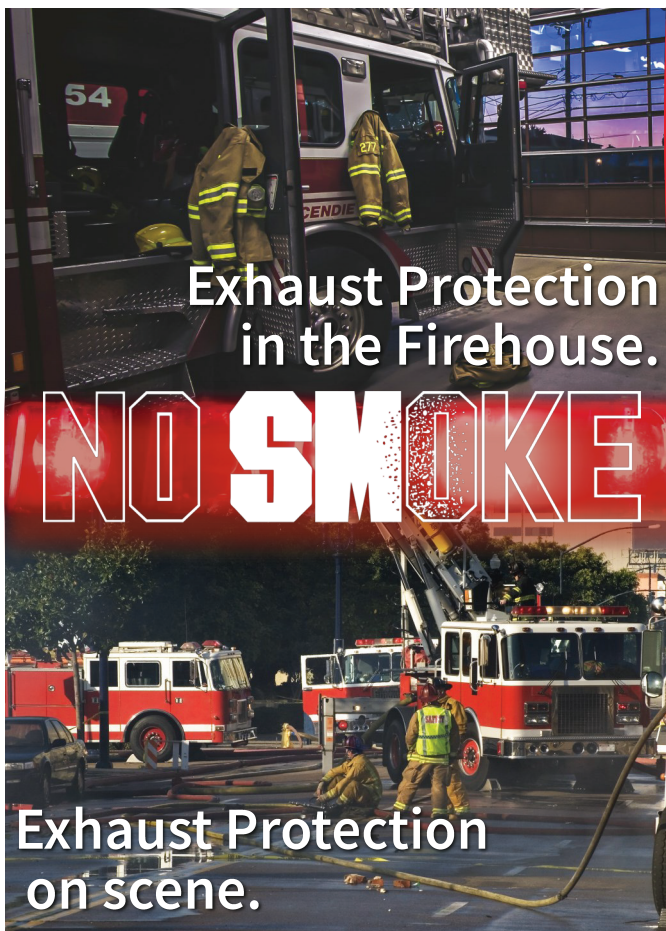


Pictured here is a command vehicle PPE SCBA locker, installed behind the driver's seat in the cab of the truck. Notice the SCBA is located behind the bunker coat in a secured bracket.

Brian Brown, a consultant with Craven and Associates, is the retired bureau chief, fleet services for South Metro Fire Rescue in Colorado, with more than 30 years fire/apparatus experience. Brown is a member of the Firehouse editorial board.

all carcinogens, when implemented correctly, a cleaner, healthier cab will help minimize the exposure with cross-contamination in the cab, the firehouse, your personal vehicle and your home. We must define a cultural strategy to prevent carcino-

genic contaminants in the cab, thus reducing job-related illness and living healthier lives. What this really means is *I can do it better for me*, so *we* can take care of each other and better care of *them*—the citizens and community we serve.



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8 Ways to Keep

1. Air filtration systems

Work with equipment manufacturers to see what is available, including HEPA filters and air scrubbers to remove airborne toxins.

3. SCBA housing

Research has shown that SCBA can off-gas after a fire. SCBA should be decontaminated at fire scenes and, when possible, be stored in compartments outside the cab to be returned to the station for full decontamination. SCBA brackets and facepiece storage should also be cleaned.

5. Exterior compartments

As the clean cab process evolves, manufacturers and departments are opting for exterior cabinetry to carry soiled PPE and SCBA and remove them completely from the cab interior.

6. Tread plates

Like the floor, clean these areas that receive debris from foot traffic and storage of equipment post-incident. Manufacturers are looking at non-porous finishes that continue to be slip-resistant.

7. Floor

Decontaminate the floor and surrounding crevices to remove any particulates that are carried into the cab from footwear or equipment and be sure to clean the gaps in materials. Manufacturers are working on finishes for materials to prevent liquid and gas contamination.

The Cab Interior Clean

2. Grab rails

Often the first point of contact for the interior of the cab, be sure to clean grab rails and handles, along with windows. Manufacturers are working on non-porous and easy-to-clean materials.

4. Doghouse

Decontaminate the doghouse/motor cover frequently due to possible contamination from PPE, firefighters and EMS equipment. Manufacturers are working on non-porous and easy-to-clean materials.

8. Seating

Decontaminate and dry seats where contaminants reside after coming into contact with dirty PPE and personnel. Some manufacturers offer removable and washable seat cover options or coverings that have barriers to protect them from liquid absorption.

CLEAN CAB

By Ed Ballam

Fire Chief & Manufacturers Share Practical Tips for **Keeping Cabs Clean**



How fire departments and manufacturers are pioneering the clean cab concept

The Coral Springs-Parkland Fire Department began its clean cab initiative in 2015 and hopes to have all of its apparatus meeting the standard by the end of 2020. Photo courtesy of Coral Springs-Parkland Fire Department

For the firefighters and officers of the Coral Springs-Parkland, FL, Fire Department, the mission to keep carcinogens out of apparatus cabs is deeply personal.

In 2016, the department lost a brother, Driver/Engineer Paul Pietrafesa, to pancreatic cancer, a deadly form of the disease closely linked with firefighting. Pietrafesa died within a short time of being diagnosed with terminal cancer, but his battle had a lasting effect on his department and perhaps the fire service as a whole.

A department taking charge

Coral Springs-Parkland Fire Chief Frank Babinec said his department was experiencing an “uptick” in firefighters diagnosed with cancer and he and the department decided to do something about it. He said when the clean cab concept was brought to him, he was receptive. “We decided to ... try to design [a truck] for the safety, health and welfare of our firefighters, rather than build something just around

what a traditional fire apparatus would look like, and that’s what we did,” he said.

After the platform aerial was delivered, Babinec said his department decided to look at the entire fleet and see what could be done to have every apparatus feature the clean cab concept. He brought in the University of Miami, which is doing fire cancer research at the Sylvester Cancer Research Center. With representatives from the Center, Babinec said his firefighters went through an extensive educational program to explain why the department was embarking on this clean cab kick. “I believe that once you explain the *why* to first responders, they tend to be more accepting of change,” he said. The department was on board with the idea of reducing carcinogens in the cab and Babinec set to change the fire suppression fleet. “As of today, every suppression apparatus I have on the



The Late Paul Pietrafesa, Coral Springs-Parkland Fire Department. Photo courtesy of Coral Springs-Parkland Fire Department

road is designed to clean cab standards,” Babinec said.

Ironically, there really are no formal standards for clean cab designs. Fire departments and manufacturers are pioneering the subject matter and are creating some generic standards, all aimed at keeping firefighters safe and reducing the exposure to contaminants in apparatus cabs. For Babinec, the standard is simple. Anything that has been contaminated at a fire scene should not go into the cab. “The technical

definition of a clean cab is anything that goes into an IDLH (immediately dangerous to life or health) environment doesn’t go back into the cab of the apparatus until it has been properly decontaminated,” Babinec said. “We could have a long discussion about what properly decontaminated means, because I don’t think we know what it means yet. There are a lot of studies out there looking at that.” Babinec said his department has created a 64-page document to share with departments interested in the clean cab concept, spelling out exactly what they’ve done to their apparatus.

One of the biggest changes is that airpicks are stored in the officer’s side front compartment. “Once our firefighters step off the apparatus, they make a U-turn right into the compartment with all the gear right in it,” Babinec explained. “Within 10 seconds, they’re stepping away from that compartment with everything they need to go to fight a fire. If they look back and if anything is left in that compart-

ment, they’ve forgot something,” Babinec said the practice prevents loss of time with firefighters having to go back into their cabs to retrieve equipment.

In addition to the airpicks, the rally compartment contains flashlights just for use in contaminated environments. Flashlights are color-coded with yellow being allowed in the cab, as they are not used in IDLH environments, and orange remaining outside the cab.

Firefighters are allowed to have clean bunker gear in the cab, which means they are dressed for the occasion, but the airpicks are stored outside the cabs, which is not a new concept, Babinec said, harking back to the days when it was standard to have the SCBAs in compartments outside the cabs because there was no technology to have them stored inside.

Since removing fire equipment from the cabs, Babinec said Coral Springs-Parkland Fire Department has seen a significant reduction in ankle, knee, back and shoulder injuries. Another benefit is that firefighters are forced to take a couple of moments to do some size-up and situational awareness while gearing up.

Partnership with manufacturers

More passive precautions the department has taken include specifying vinyl seats due to the fact that they are easy to decontaminate by wiping and cleaning. Babinec said he would like to see apparatus manufacturers work on creating comfortable seats with fewer seams. Babinec asked that the apparatus maker, in this case Pierce Manufacturing, to create floor surfaces with as few seams as possible and all electronic and electric hardware elevated off the floor so the apparatus can be washed out with a hose and cleaned more easily. Smoothed surfaces are also used throughout so they can be wiped down and decontaminated easily, Babinec said, and special HEPA filters help eliminate microscopic particles that might contaminate the cab environment.

His apparatus also features vertical exhaust stacks to keep diesel emissions out of the cab, the main initiative of the clean cab concept. He is also working with the apparatus manufacturer to have an interlock mechanism to have all the power windows close when the truck is in pumping mode. That would be a feature for future apparatus, he said.

Babinec noted that his department is happy with the concept they’ve developed and said he plans to have 100 percent of his fleet be included in the clean cab program by the end of 2020. The department is currently running about 16,000 calls annually in a 40-square-mile area, protecting a population of 160,000 residents. His firefighters are also paramedics and 70 percent of the calls are EMS-related. That means firefighters spend a significant amount of time in the apparatus cabs, which is why it’s important to reduce the exposure to carcinogens, he explained.

“The biggest thing is training and decontamination,” he said, noting that a significant portion of the 64-page document his department created is dedicated to when and



Coral Springs-Parkland Fire Department has placed its SCBAs and firefighting equipment in outside cabinets to keep contaminants out of cabs. Photo courtesy of Coral Springs-Parkland Fire Department

CLEAN CAB

how to do thorough decontamination. In fact, at Babinec's request, Pierce added an automatic feature to the apparatus command instrumentation that reminds firefighters that a comprehensive decontamination must be done every 30 days. "You can spend a lot of time and effort on the clean cab concept, but if you can't maintain it, what are you doing? You're spinning your wheels," Babinec said. "You've got to train your people to do proper decon and to maintain the integrity of the environment once you've created it."

Over the past few years, apparatus manufacturers have spent a great deal of time and effort to create features designed to help firefighters keep their apparatus cabs clean. Scott Wieshaar, Spartan Motors' executive director of product development, said the clean cab concept has been a "hot topic" for months, but there's no standard or definition for what it means exactly. "I have yet to find two fire departments that view clean cabs the same way," Wieshaar explained. "It's a rather obtuse subject and it means different things for different people."

That's why Spartan is spending time listening to customers and giving them what they think they need to achieve their goals, Wieshaar said. For Spartan, many of the features customers require for clean cabs are already built into the company's cabs. For instance, Spartan has been offering a flat floor design—ideal for decontaminating washouts—for years, he said. Spartan has also been working on eliminating "nooks and crannies" where contaminants can hide and be difficult to remove, Wieshaar noted. The company has also offered a variety of external cab compartments for years, and many of them are well-suited for the storage of contaminated fire gear and equipment. "We've got a whole variety of external cabinets on our cabs," Wieshaar said. "They can be used for turnout gear, SCBA storage, etc., so you don't have to bring that stuff into the cab."

Spartan is also working on a number of different coatings and surfaces for cab interiors, all with the intent of making them easier to wipe down during decontamination. The heating, air conditioning and ventilation system developed by Spartan is exceptionally well-designed for the clean cab concept in that it's oversized and can rapidly cool down or warm up cab interiors, Wieshaar said. "The system is oversized for the cabin, which means air is circulated through a HEPA filter many times in a short period of time, which means we grab a lot more particles that are inhaled or settle on surfaces," he noted.

Spartan has also developed a wash down system for gross decontamination of firefighters and their gear, noting the company has a water heater for firefighter comfort and a separate 12-volt pump system for the wash down so the apparatus fire pump doesn't need to be engaged for decontamination. Spartan has developed a clean cab that the company said will be demonstrated at trade shows later this summer and fall.



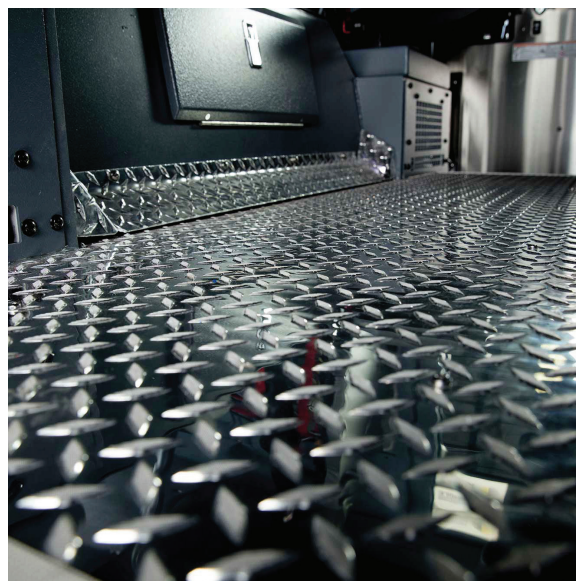
Roll-out shelves for gear and SCBAs makes it convenient for firefighters to leave contaminated items out of cabs. *Pierce Mfg*

Listening to customers and spreading awareness

Pierce Manufacturing is in the same stage of clean cab development, listening to customers, including Coral Springs-Parkland, and coming up with sensible solutions to the problem, said Dave Roloff, Pierce's manager of sales and market development, custom cab and chassis. "What we want to do is provide a complete awareness of what is going on out there," Roloff said.

Keeping cabs clean doesn't have to be a complicated or expensive process, Roloff continued. "It can be simple things like making sure the windows are up while at a scene," he noted. "Just rolling up your windows can reduce a lot of contamination and debris inside the cab."

Steering customers toward cleanable, smooth surfaces is also another low-cost solution to keeping cabs clean, he said, noting that reducing porous surfaces, like those found on fabric seats, will go a long way to reducing carcinogens in cabs. Something else to consider is lighter color interior surfaces so particulates on surfaces will be more easily seen and removed.



Non-porous, flat floors in cab interior make it easier to wash out contaminants and debris after significant fire events. *Pierce Mfg.*

CLEAN CAB

Roloff said he's found that all the major apparatus seat manufacturers are more than willing to work with customers and apparatus manufacturers to come up with the best seat surfaces. He said it's Pierce's job to educate its customers as to what is available to help them achieve their goals. One significant way Pierce has done that is through its Carcinogen Awareness & Reduction to Exposure (CARE) initiative, which is a partnership between Pierce and the Firefighter Cancer Support Network, Roloff said.

"We hear more and more that the number one killer of firefighters is cancer," Roloff said. "There are some things you can't control on firegrounds, like the man-made materials burning dirtier than the natural materials of yesterday." That's why it's important to take control of things like contamination in the cabs, he explained. "We can't solve the problem, but we can help reduce the problem," Roloff said. "Unfortunately, we don't have the silver magic bullet."

Mike Schneider, a sales representative for Ten-8 Fire Equipment, a Pierce dealer in southeast Florida, knows all too well the personal cost of firefighter cancer—he worked with Coral Springs-Parkland Firefighter Pietrafesa, the driver/engineer who succumbed to pancreatic cancer. Schneider worked with Pietrafesa on developing the department's clean cab apparatus. "It's a topic that is near and dear to me," he said, noting that he lost a close friend



Flat surfaces, devoid of nooks and crannies, makes debris removal inside cabs easier for firefighters. *Spartan Motors*

in the passing of Pietrafesa. "I've been trying to have the conversation with all the fire departments I work with. My approach is, have the conversation and then leave it up to the department ... I have seen the videos. I've sat with the doctors from Miami. I've heard the statistics. It's a very important subject."

And if there are firefighters and departments that need convincing, Coral Springs-Parkland Chief Babinec suggests they view a video his crew made documenting Pietrafesa's story and that of the department on YouTube at [youtube.com/watch?v=zFuY8z2LuSI](https://www.youtube.com/watch?v=zFuY8z2LuSI). ■

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