By RON MOORE

Extrication Challenges Of Advanced Steel in Vehicles – Part 1

SUBJECT: Advanced Steel

TOPIC: Extrication Challenges of Advanced Steel in Vehicles, Part 1

OBJECTIVE: Review the cutting capabilities of vehicle rescue tools including hand tools, electric cutters, air-powered cutters and hydraulic rescue system cutting tools.

TASK: Given the information contained in Part 1 of this series, the rescuers will be able to assess the capabilities of the cutting tools carried by their department for vehicle rescue work that involves vehicles built with reinforced A-pillars, B-pillars and roof rail structures.

THE SERIES...

- ✔ Part 1: More Steel
- ❑ Part 2: Advanced Steels
- ❑ Part 3: Cutting Tools
- ❑ Part 4: Power Cutters
- ❑ Part 5: New Rescue Techniques

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This image shows a cross section of the A-pillar of a Volvo C-70 automobile. The pillar metal is just shy of being quarter-inch-thick steel. Up until now, the typical automobile A-pillar that we encounter is approximately only one-16th-inch-thick steel.

Due to the construction of today's vehicles and the variety of ways in which people can be trapped inside a vehicle after a collision, rescuers are being called upon to perform a wide variety of extrication tasks. One common task involves working to force open and remove a jammed door. However, after opening and removing a jammed door, the B-pillar or roof may still obstruct the ability of the rescue team to efficiently remove the patient. Our most common solution to a crushed roof or a deformed B-pillar that blocks access when we want to remove the patient is to cut away the B-pillar or cut the roof off. Power cutters, electric recip saws, even an air chisel can accomplish this task.

With increasing frequency, fire departments across the country are reporting an inability to cut through structural areas such as the B-pillars of late-model vehicles. Our normal rescue cutting tools, whether hydraulic, electric or air-powered, are stalling out. That power cutter you have in your tool arsenal that has worked so well for so many years, the one that has cut through many roof posts and B-pillars successfully in the past, may finally be out-gunned by the steel found in new-model vehicles produced within the last few years. What fire departments

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These new vehicles will challenge rescuers by resisting efforts to cut vehicles apart if the occupant is trapped.

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This B-pillar from a Subaru Impreza vehicle has been sliced open to expose the inner layers of steel and the steel rebar welded inside. A power cutter would have to cut through at least six layers of steel plus the solid rebar if it were to be successful.

Courtesy of Rockville VFD

The 2008 Camry B-pillar crushed under the power of the hydraulic rescue cutters being used by the Rockville, MD, volunteer firefighters but did not cut through. Depending upon where you count, the cutters stalled out while trying to sever eight or as many as 14 layers of steel in the pillar. Later, a rotary saw with an abrasive blade cut the pillar.

are encountering is the newest challenge to confront extrication personnel: the challenge of structurally reinforced steel in late-model vehicles. It's almost as if a tough, crash-resistant roll cage is now being designed into the structure of our newest automobiles and SUVs.

The trigger event that has brought about the improved "crashworthiness" in late-model vehicles is the government's push to improve the side-impact and roof-crush resistance by changing federal motor vehicle safety standards. Automakers have responded to this engineering challenge in two basic ways. One solution that the vehicle design engineers came up with is to reinforce the side and roof structure areas of a vehicle with more layers or thicker layers of steel. The second engineered solution is to make areas such as B-pillars, roof rails, and rocker channels of ultra high-strength steels, otherwise known as advanced steels.

On the bright side, it must be mentioned that due to the integration of more layers of steel in a vehicle's structure or by integrating new advanced steel alloys, occupants are less likely to be injured and trapped. These new model vehicles are already proving themselves to be more crashworthy than what responders have found in the past. At the same time that more steel or use of advanced steels make for a stronger and more crashworthy structure, these new vehicles will challenge rescuers by resisting efforts to cut the vehicles apart if the occupant is trapped.

In this first installment of our five-part series, we focus on the "more steel" approach to vehicle crashworthiness. Two good examples of the "more steel" solution can be found inside Volvo and Subaru vehicles. Volvo's C-70 auto for example, has A- and B-pillars constructed with nearly 1/4-inch-thick walls of steel. With a typical vehicle using merely 1/16-inch-thick layers of steel to create a roof pillar, the Volvo vehicle will challenge rescuers working to cut the roof off, open up a crushed sidewall, or move the dash and firewall. This author's experience accomplishing extrication tasks on these Volvo vehicles confirms that the thicker steel approach to crashworthiness makes for one tough vehicle to tear apart.

An even better example of a car manufacturer using the "more steel" approach for vehicle crashworthiness is Subaru. With Subaru, it is very possible that a rescuer could encounter multiple layers of steel making up the B-pillar of certain models. To the rescuer's surprise, as they cut through the B-pillar, their tool could not only be cutting through multiple layers of sheetmetal, but may encounter one or even two steel rebar rods welded inside the hollow of the pillar.

In Maryland, firefighters from Rockville Volunteer Fire Department arrived at a serious collision involving a 2008 Toyota Camry. The vehicle was struck on the driver's side, trapping the female driver. The Toyota B-pillar, when compressed or squeezed by the blades of a hydraulic power cutter, resembled a folded wallet. The rescue team's hydraulic tools were unable to cut through the B-pillar at this extrication scene.

So many extrication incidents have occurred nationwide where firefighters were unable to cut through B-pillars on 2007 and newer vehicles that the Associated Press ran a feature story on the challenges confronting rescue personnel in March 2008.

In Part 2 of this series, we'll explain what advanced steels are and how they too influence our vehicle rescue activities at crash scenes.

TASK: Given the information contained in Part 1 of this series, the rescue team will be able to assess the capabilities of the cutting tools carried by their department for vehicle rescue work that involves vehicles built with reinforced A-pillars, B-pillars and roof rail structures.