'Fast Changing Challenges for Rescuers'

By Len Watson

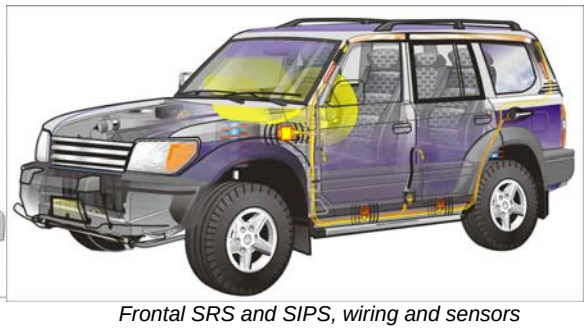
The importance of Crash Rescue

Road accident injuries are the 9th leading cause of death in the world today and the prediction for 2020 is that they will become the 3rd leading cause of death and disability[1]. Currently road kill takes more than 1 million lives annually and with the understanding that for each death there are at least several seriously injured victims, each requiring long stays in hospital and rehabilitation, there is a serious cost implication of up to 2% of gross national product. The current health, social and economic impact, on predominantly previously fit young persons, makes this issue a major public health challenge for the 21st century.

In the third world, pedestrians and 2 wheeled vehicles hold the higher percentage of death and morbidity whereas in developed countries car-users are the greater percentage, where many will be entrapped in their vehicle and require extricating from their predicament. Pedestrian safety, overcrowding on public transport, unroadworthy vehicles and 'end of life vehicle' versus new, makes the challenges facing rescuers universal.

Governments and the motor industry have increased their resolve to improve transport infrastructures and build safer vehicles. However, road improvements, speed cameras, heavier policing and new vehicle technology seem to be less than what is required. Although DOT statistics point to a reduction in the serious injury rate we can also see a similar percentage increase in road kill. In the developed world, the car-user is most at risk. An obvious cause is the increasing disparity between new and old vehicles. We can appreciate that new design vehicles are built to a higher safety standard and that ownership assures greater survivability, whereas occupants in older vehicles are more at risk. Additionally, in higher speed impacts and where mass differential increases (car versus truck), bodywork deformity and intrusion in the new design vehicle will entrap occupants in a much more rigid safety cell. In fact 'new vehicle technology' has much more serious implications and far-reaching complications for the emergency services.

HSS - *High Strength Steels*



Frontal SRS and SIPS, wiring and sensors

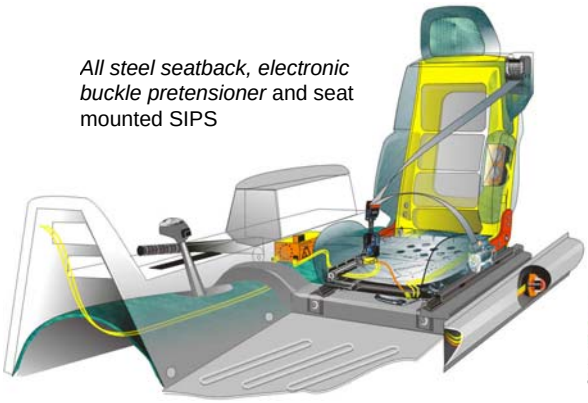
New vehicle developments:-

- EPG - All round extra protective glass
- Dash cross-member
- Multi generator steering wheel airbag
- Multi generator front passenger airbag
- All position seatbelt pretensioners (Electronic or mechanical)
- SIPS – side impact protection systems
  - Door airbags (Trim or window deploying)
  - Seat airbag (Electronic or pyrotechnic)
  - IC - Inflation Curtains and HPS - Head Protection System

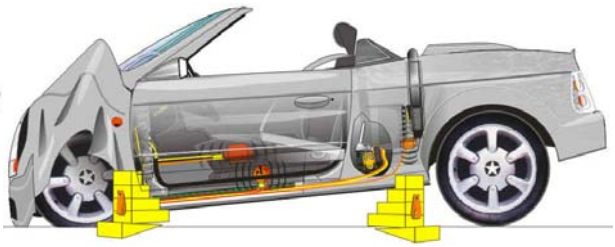
[1] WHO - World Health Organisation report 2002: 'Reducing risks and promoting healthy life'.

- ROPS - roll-over protection system for convertibles and sports cars
- Boron steel bars and gussets for side protection
- Boron steel strengthening in roof pillars
- Boron steel seat brackets
- All steel front seat backs
- Strengthening cages to front footwells
- Aluminium Foam Sandwich
- High pressure gas struts
- Duel fuel and bi-fuel systems
- Hybrid duel power
- 'Keyless-go' & 'Ready-Go'
- 4 door pillar-less side construction (Centre posts built into doors with new locking system)
- FCV - Fuel Cell Vehicle (Hydrogen powered vehicles)

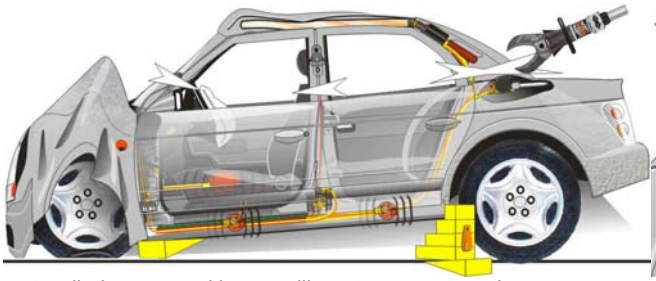
All steel seatback, electronic buckle pretensioner and seat mounted SIPS



ROPS – *roll over protection system and SIPS*



New innovations such as glazing, motive systems and safety features incorporated within new vehicle designs, have created very real challenges for the rescue profession. Many of these new developments now affect commonly practised 'tried and trusted' extrication evolutions. Furthermore, the need to be able to perform extrication evolutions alongside undeployed/live systems has arisen**.** Certain accident types will make it impossible for the rescuer to disconnect the battery and many extrications will have to be performed with live systems (i.e. under-rides, vehicle on-its-roof or battery located under trapped person etc). Moreover capacitors on modern vehicle alarms can remain energised for a considerable time and system wiring will run to all locks making it virtually impossible to completely de-power the crash damaged vehicle.



IC cylinder mounted in rear pillars, SIP system and sensors

HPS cylinders mounted in the windscreen pillars

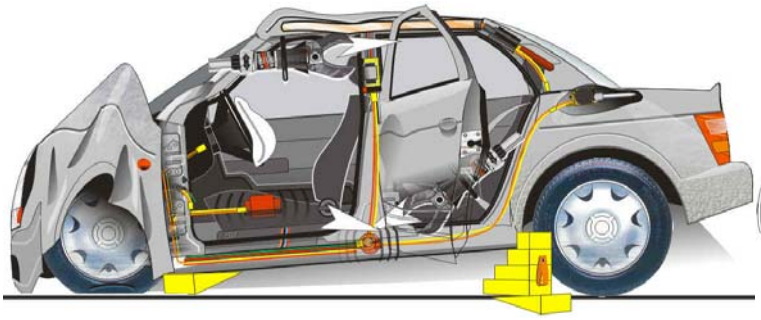
Upgrading equipment inventories

Not only is the current status of extrication under attack but the ability of fire service rescue equipment is unlikely to meet the demands that new steels place on them. In fact HSS - high

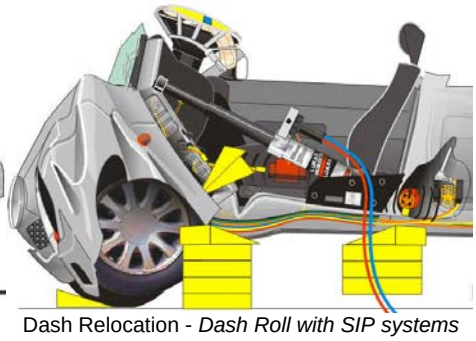
strength low alloy and Boron steels can be found across the full range of most manufacturers products model year 2003 onwards.

Rescue tool companies have kept abreast of current developments and have available a range of tools that sport faster operation with higher forces that not only meet today's requirements but offers suitable technology for the immediate future. Cutters with up to 70 ton/ne cutting force and spreaders in excess of 20 ton/ne force offer rescuers the means to meet these new challenges.

These problems already exist and the implications infer that unless rescuers tackle these challenges and upgrade their equipment, far from delivering best value to their customers, they will become a root cause of the problem and will not be able to offer the necessary solutions.



Side Removal – *Cutting away the centre post and rear door*



Dash Relocation - *Dash Roll with SIP systems*

DRA - Dynamic Risk Assessment

The importance of 'Generic' risk assessment procedures must be stressed; as vehicles of the same model year may incorporate different components and batches e.g. SRS systems may be supplied by different manufacturers or upgraded to multi-functional modules. Customers' preferred options will always be an unknown quantity and cannot, by any stretch of the imagination, be part of any planned precognition. It is therefore essential to adopt a 'pry before you work' concept – i.e. Strip the trim to pillars and posts to reveal the installation slots so that the exact position of SRS, SIPS and, where practical, sensors and wiring can be identified. This approach is being universally adopted throughout the fire rescue service. When performing any extrication strategy it has now become mandatory to view and risk-assess prior to conducting any evolution that could possibly alter the integrity of any system that could cause injury.

New Challenges

It is not enough to know or be able to identify where safety systems, other components and HSLA steels etc are located. What can and cannot be undertaken without incurring risk is of vital importance and relating that to performance and outcomes is essential. The rescuer must first be able to recognise risk and have an appreciable understanding of what can possibly go wrong and how to manage the situation accordingly.

Equipment must be able to perform the job, and training built to reflect real end user needs. Unfortunately for the victim, rescue has no accountability, has no mechanism in place to collect and analyse data, and no minimum standard to rise above.

New developments have left rescuers behind. Training departments are struggling to acquire relevant information and develop safe procedures and techniques to meet these new challenges. Newly perceived risks can be triggered by short circuit, static charge, crushing or knocking against with a heavy rescue tool and steel gussets and brackets that resist all efforts to cut. Air curtain inflation cylinders, compressed natural gas fuel systems charged to 5000 psi (320 Bar) and battery packs of Potassium Hydroxide carrying a charge of up to 500 volts DC current are amongst some of the potent risks that preparedness training must address. If Training Departments are at all serious in meeting their obligations, the current approach to

MVA training cannot continue. Nor can limited rescue inventories be expected to meet this vitally important operational role.

The essentials for future preparedness

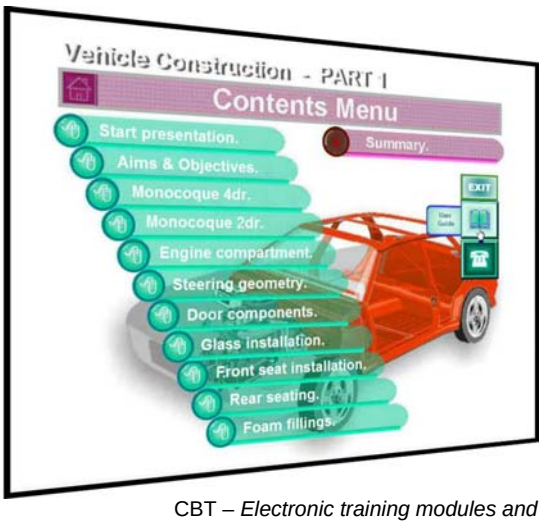
Vehicle extrication – dynamic risk assessment and management needs a support mechanism. Today rescuers cannot possibly retain all the necessary information and be expected to always make the correct judgment call. The rescuer needs help: not tomorrow but now! We live in the age of information technology and instant access to safe and relevant codes of practice is essential to support extrication evolutions.

Currently ‘end of life vehicles’ used for training purposes incorporate little or no Supplementary Restraint Systems. This will gradually change to where ‘end of life’ vehicles incorporate SRS. The question now arises, should it become mandatory to remove such systems before we commence training exercises and miss out on the opportunity that training with such systems offer?

As many ‘real time’ extrications have to be performed with live systems, a positive advantage could be realized in conducting ‘real’ training with live systems. If the risk factor is properly assessed and precautionary measures fully implemented, extraordinary training of this nature can be safely managed and undertaken as required.

The alternative will necessitate rescue crews meeting the challenges of ‘real time’ rescues without having any first hand knowledge to guide them through the extrication process.

What can the passive car ‘end of life’ vehicle really offer the student in terms of extrication training? Also, to prepare an SRS equipped vehicle, as a ‘passive car’, is likely to prove cost prohibitive and would incur its own ‘health and safety’ implications in terms of module removal and disposal.



CBT – *Electronic training modules and Trainer linked student self assessment programs*

Information technology – *Risk assessment information centre designed for touch screen tablet computer for fast information access at the roadside*

CBT – Computer based training, information technology and simulation

CBT has much to offer training departments and as an information centre for - risk identification, control measures, risk critical information and extrication evolutions that take new technology into account. It is not enough to simply identify the risks involved. To safely manage the extrication process, the rescuer must be able to put in place the correct control measures, eliminate, reduce or mitigate risk, know when to disconnect or cut wiring and successfully manage the risk critical implications.

This also applies to Training Managers, perhaps more so, especially where students have little or no previous experience. CBT may offer the only solution for all the issues involved and underwrite, to a large degree, operational and training needs. With the possibility for 24/7 workstation and fire-truck tablet availability, immediate access to an information centre for risk identification, assessment and management would appear to offer the ultimate solution to an otherwise seemingly insurmountable problem.

It seems unprecedented, that performance, accountability and analysis have no part in MVA rescue. To improve and maximise rescue, perhaps what is now required, is a mechanism to establish best value, electronic data collection, analysis and dissemination, along with e-learning programs and of course the correct equipment for the task. ■