



Boron Steel in Vehicles.

Technical Data:

Boron steel has been used in the motor industry for a number of years and its application has, and continues to cause rescue professionals varying degree of problems. The process of changing mild steel to boronated steel is completed by mixing 1% Boron to form an alloy and subjecting the final alloy through a series of quenching processes, the final product is a Ultra-High strength steel (UHSS).

Melting point: 3,767 degrees Fahrenheit.

Boiling point: 7,232 degrees Fahrenheit.

Yield point: 1,300 – 1,400 N/mm² (195,000 – 203,000 psi)

The final finished product has a crystalline structure which ensures a very effective strength to weight ratio, this also causes problems as traditional reciprocating saws and hydraulic cutters are sometimes ineffective in cutting Boron steel. Used within the motor industry to provide extra strength in passenger safety cells and adding additional structural strength in reducing flexing in the body shell of vehicles (anti- roll bars).

(Boron steel shown in red.)



Cutting Boron Steel.

Most vehicle manufacturers recommend cutting Boron steel with a plasma-arc torch or disc cutter, both of which are not suitable for extricating casualties at the scene of road traffic collisions, reciprocating saws are inefficient requiring constant blade changes and specialist blades designed to grind rather than cut. Most New Car Technology hydraulic cutters (NCT) can cut Boron steel providing the tool is operated correctly and the tool operator does not allow the tool to twist and the maximum cutting force of the tool is used by ensuring the metal is tight to the throat / centre of the tool. Hydraulic cutters that exceed 130Kn cutting force is needed to cut Boron, however, the metal is not used as a finishing metal and the Boron is often shrouded in mild steel or the painted structure allowing the metal to safely 'shear' rather than be cut, which is why a characteristic bang is heard when cutting steel that is un-stressed.

Cont:

Common myths.

Boron steel cannot be cut with conventional hydraulic tools! Incorrect, in the early days of Boron, the new material caused some tool manufacturers to redesign their hydraulic tools to encompass higher cutting pressures and redesigned blades (NCT Cutters).

You have to reform the vehicle before cutting Boron! Incorrect, once Boron has been bent it cannot be reformed without fracturing the metal. This is due to its crystalline (Glass like) structure; reforming vehicles will cause the Boron to fracture at the weak point which is not always a place that needs cutting.

Cutting Techniques.

Boron steel is often shrouded with mild steel and is used to reinforce the passenger safety cell of the vehicle. It is often wise to avoid cutting Boron steel as the material fractures or shears when subjected to excessive force, this 'fracturing' of the metal is often disturbing for casualties as the subsequent vibration and noise can be violent. Reforming the damaged parts of the vehicle using rams or spreaders can reduce the shearing forces of the metal when cutting however; this is not a pre-requisite for cutting Boron. Reciprocating saws may be used in conjunction with a grinding blade; traditional 'toothed' blades are largely ineffective on Boron. A cutting force in excess of 130Kn is required to shear the metal and most NCT tools are capable of this when the full capacity of the cutters is used through correct tool application.



Boron placement.



Boron reinforced 'B' Pillar (Rods)

It is important that the hydraulic cutters are not allowed to twist as this will cause the blades to shatter, sometimes with explosive force. Safety glasses and full face visors are required when cutting vehicles using hydraulic tools to prevent cut or sheared metal from impacting with the eyes and face. Consideration should also be given to cover the cutters with protective covers when cutting Boron close to the casualty to prevent debris being ejected at high speed.