Types of Metals used in Cars

Mild steel—Mild steels are the softer steels that most of us are familiar with when it comes to vehicle extrication. The most common areas we find this type of steel are in the rocker panels, floor pans, quarter panels and fenders. This type of steel will cut very easily, and when we use our spreaders and rams, we won't often have trouble spreading or moving this type of steel. Generally, most of the problems firefighters encounter with mild steel is when they attempt to use it as a hard push point. The steel will most often "give" before the object they intend to move, and the operator will not achieve the desired result. These areas containing mild steel should be considered soft push points during extrication.

High-strength steel—these types of steel have relatively the same qualities of mild steel only they are a little bit stronger. These can often be found in the hoods, door skins and quarter panels.

High-strength low-alloy steel—these types of steel are used in the construction of the pillar posts, side members, front and upper rails and the shock tower supports. These steels have high tensile strengths and are used to give the auto extra support. When used in the A, B and C pillar posts; they give the car better rollover protection and help keep the roof from collapsing in on its occupants. High-strength low-alloy steel will be noticeably harder to move with a spreader or ram. Areas containing this steel will work well as hard push points during extrication, but keep in mind older cutters may not have the capacity to cut a triple-rolled high-strength low-alloy steel A- or B-post.

Ultra-high-strength steel—Ultra-high-strength steels have incredibly high tensile strengths, some more than 180,000 psi. You will find this type of steel in the side-impact door beams, reinforcement bars under the dash and in the bumper reinforcements. Only attempt to cut this type of steel if it is absolutely necessary; I have never attempted to cut it myself but I have been told it will fragment when you cut into it.
Boron steel—Car manufacturers are now using boron tubes in the A-posts of some vehicles. These boron tubes can have tensile strengths as high as 150,000 **psi.**

Cast magnesium—some car manufacturers are using cast magnesium in the transverse dash beams. Notice the magnesium dash beam and its location in the picture as it runs from one side of the car to the other. Auto manufacturers are using these beams to give the car more lateral stability and are using them to hang all the components on the dash. This actually helps us when we're doing a dash roll-up because all of the components move with the beam, but one of the drawbacks to this technology would occur during a car fire, because we all know what happens when we put water on magnesium as it burns.

The type of boron steel used on vehicles today has extremely high strength. The boron steel used on Volvo cars has a yield point of about 1,350-1,400 MPa (196,000-203,000 psi). That's about four times stronger than average high-strength steel. But the process used to make it that strong takes away some of the steel's workability properties, such as being able to straighten it.

For now, boron steel is found primarily on European vehicles, such as the dash panel on the 2002 Porsche Cayenne SUV, the safety bar around the rear seats on the 2003 Porsche Boxster, the door guard beams on the 2003 Porsche 911 Carrera, and the inner B-pillars on the 2003 Mercedes-Benz E Class. Volvo probably uses boron steel the most. Boron is used on the bumper reinforcements and guard beams on the 2004 Volvo S40 sedan and 2005 V50 station wagon. The 2003 Volvo XC90 SUV has several applications of boron steel, including the inner B-pillar reinforcements, the roof bow between the B-pillars (if there is no sunroof), and the inner rear body panels. The 1999-2004 S80 and 2001-2004 V70 and S60 also have boron steel inner and outer rear body panels.

Boron Steel

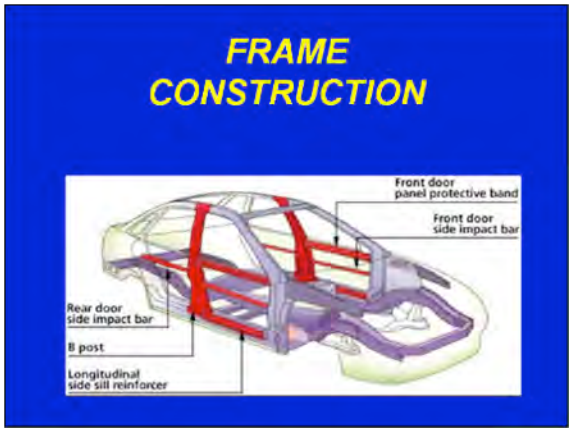
Much has been written about the new range of Advanced High Strength Steel being used

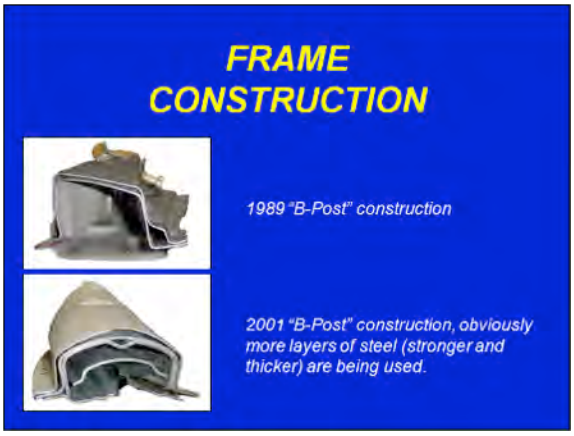
In Modern car design. USIBOR-BTR-Boron are all the same grade of steel, just with a different name, depending which country it comes from. It is very strong but light in weight.

This steel will be found in the new Volvo XC90, Saab, BMW E60, Porsche Cayenne, and VW Toureg and many other cars. The type of boron steel used on vehicles today has extremely high strength. The boron steel used on Volvo cars has a yield point of about 1,350-1,400 N/mm2 (196,000-203,000 psi). That's about four times stronger than average high-strength steel. In general it is used to provide extra strength in the sill area, B Post, chassis areas, rear cross members and as roll over bars.

It should be noted that when dealing with Boron Steel, it would take substantially more pressure to relocate it. This is due to the heating process that the steel is subjected to when it is formed in production. If cutting of the steel is required, it is recommended that a cutting wheel is used or a plasma arc torch.

Hydraulic cutters or reciprocating sawsShould not be used. Boron steel will remove the teeth on a reciprocating saw blade and Spread or break hydraulic cutter blades.





High Tensile Steel
High tensile steel is also used commonly within the door structures of modern vehicles.

Side-Impact Door Beams provide protection to the passengers during a side impact and absorb the energy of the impact. High tensile steel is difficult to cut with a reciprocating saw blade or hydraulic cutters. The easiest method is through the use of a cutting wheel with either diamond or composite disks.

Tensile strength σ_{UTS}, or S_U is the stress at which a material breaks or permanently deforms. Tensile strength is an intensive property and, consequently, does not depend on the size of the test specimen. However, it is dependent on the preparation of the specimen and the temperature of the test environment and material.

The below link is a very informative guide to cutting Boron

http://www.resqmed.com/BoronSteel1.pdf

Martensitic-phase steel MS-W is a hot rolled advanced high-strength steel which in the thermo-mechanically rolled condition exhibits very high tensile strengths between 1200 and 1450 MPa. Due to its balanced content of ferrite and Martensitic it offers comparatively good cold forming and welding properties in relation to its high strength. It is particularly suitable for the production of reduced- weight cold- formed crash-relevant auto components such as door intrusion beams, bumper beams, body reinforcements and high-wear parts in vehicles. Martensitic-phase steel is available as MS-W 1200 with a minimum yield strength of 900 MPa and a minimum tensile strength of 1220 MPa.