

## **Surgical Instrument Metal Quality**

### **Stainless Steel**

Stainless Steel (inox) is a ferrous alloy with a minimum of 10.5 percent chromium content. The name originates from the fact that stainless steel does not stain, corrode or rust as easily as ordinary steel. This material is also called corrosion resistant steel. Steel is made stainless by adding nickel and chromium in measured quantities. The more chromium used in making stainless steel, the softer the alloy becomes, which is undesirable in the manufacturing of surgical instruments. Therefore, the mix required to make quality medical instruments is very specific and has well defined parameters.

### **Titanium**

Titanium is a very light, strong and lustrous white metal, less than half the weight of steel. It has a very attractive strength to weight ratio. Titanium is alloyed with 6 percent aluminum and 4 percent vanadium. One of titanium's most notable characteristics is that it is as strong as steel but is only 60 percent its density. This light weight provides better flexibility, strength and decreases user fatigue. Titanium and titanium alloys readily form stable protective surface layers, which give them excellent corrosion resistance in many environments, including oxidizing acids and chlorides. This material can be heated up to 440° C, making it suitable for heat sterilization. Due to its complex machining and finishing processes, titanium instruments tend to be more expensive.

### **Tungsten Carbide**

Tungsten carbide is among the hardest materials known and is sometimes referred to as "man-made diamond". The primary advantage of tungsten carbide is its hardness which makes it very resistant to wear and corrosion. To obtain its unique hardness, the unhardened tungsten carbide must be heat treated or "sintered" at 1454° C to 3200° C. Tungsten carbide inserts are used in surgical instruments to enhance their performance and longevity. These inserts are micro bonded to the working end of the device to provide years of increased performance. Tungsten carbide needle holders and forceps grasp more securely and are more durable than their stainless steel counterparts. Tungsten carbide scissors and bone rasps cut better and need much less sharpening than similar conventional instruments.