Surgimax is using different types of material for manufacturing of surgical instruments, in below you can find detailed information about the material and their properties:

**What is AISI?**
AISI stands for American Iron and Steel Institute. AISI operates in the United States and North America only. AISI is concerned with steel and iron product. There are different materials which are being used in surgical instruments manufacturing i.e. AISI 304 or AISI 410.

**What is ASTM?**
ASTM stands for American Society for Testing and Materials. This was founded in the late 1800s and has become one of the largest standards developers in the world. They develop and produce standards for both metallic and non-metallic materials. Some will have an AISI number as well as an ASTM number.

### Austenitic Stainless Steel
Austenitic or nonmagnetic stainless steels, are classified in the 300 series, with 18% chromium and 2% to 10% nickel for enhanced surface quality, formability, increased corrosion resistance and wear resistance, and are nonhardenable by heat treatment because carbon content is very low which is only 0.08%. These steels are the most popular grades of stainless steel due to their excellent formability and corrosion resistance but these will not hold a strong cutting edge. Austenitic stainless steel grades include are type 301, 304, 305, 309S, 316, 316L, and 321.

### Martensitic Stainless Steel
Martensitic, or hardened stainless steels, are classified in the 400 series, usually with 11.5% chromium up to 18% chromium, with higher levels of carbon than austenitic, and are capable of being heat treated to a wide range of hardness and strength levels. This series is used in most O.R quality instruments, cutting and non-cutting, because it has a high tensile strength, can hold edge for a long time and is resistant to corrosion if not looked after properly. Commercially produced AISI grades of this class are type 410, 419, 420, and 459M.

### Stainless Steel Type AISI 304
This material is easy to machine and form. Instruments or components that do not need to be hardened, such as scissors, retractor blades, hollow handles, hospital hawsers, nuts, screws and pins etc. are usually made from this grade.

### Stainless Steel Type AISI 316L
It is a very high purity alloy. It stands for low carbon. It is also called SMO. It is a preferred material for making most orthopaedic implants, such as plates and screws, nails, prostheses and aneurysm clips etc. Certain instruments that have prolonged contact with implants also utilize this material to avoid transfer of dismaliur metal particles which could cause galvanic corrosion reaction on the implants. It is however important to note that metal implants and prostheses can sooner or later fail since no metal has yet been developed that will equal the revitalizing durability of living bone.

### Stainless Steel Type AISI 410
This is a most commonly used grade for the manufacture of non-cutting instruments. Typical examples are hemostats, assisted forceps, retractors and so on. It is easy to work with and has Rockwell Hardness in the range of C-40 to C-45. It is a misconception that this grade is inferior in any way as it clearly competes with the British, German and International Standards for application in surgical instruments.

### Stainless Steel Type AISI 420 & 440
These are useful grades for cutting instruments such as scissors, knives, chisels, rongeurs, bone cutters, bone drills and taps etc. AISI 420 can get Rockwell Hardness in the range of C-40 to C-50 but if hardness around C-55 is required then grade AISI 440 with more carbon is appropriate.

### Titanium
Type ASTM F67 - Commercially Pure grades 1, 2 and 4. It has the same strength as steel but weighs only 60 percent of the steel. It is highly corrosion resistant but very difficult to work with. Some micrournery instruments, mandibular implants and bearing wear hip prostheses are made from it. Its biocompatibility is far more superior than any other currently employed implant material. It can be finished in a distinct blue colour but repeated autoclaving may give it a reddish tinge.

### Other Metals
There are also many non-ferrous materials that are used in instruments for their specific properties. They may be easier to machine or form and more suitable for procedures or budget.

### Application International Standards
ISO 7153-1
BS 5194: Part 1
DN 56296

### Stainless Steel
Stainless steel is an alloy of iron with a minimum of 10.5% Chromium. Chromium produces a thin layer of oxide on the surface of the steel known as the ‘passive layer’. This prevents any further corrosion of the surface. Increasing the amount of Chromium gives an increased resistance to corrosion. Stainless steel also contains varying amounts of Carbon, Silicon and Manganese. Other elements such as Nickel and to enhanced formability and increased corrosion resistance. It comes in sheets and bars which are being used in surgical instruments manufacturing.

### Brass and Copper
Free cutting brass type 360 and nickel-copper Class A or B are easily formed, machined and welded therefore useful for making instruments that are otherwise hard to make from steel or require malleable features. Certain instruments made traditionally in these soft metals are proctoscopes, malleable urethra sounds and retractor blades, catheters and cannulas. In order to enhance surface wear these are usually plated.

### Different Finishes
Surgimax is supplying surgical instruments in different finishes depending on customer requirements which are as follows:

#### Mirror
A mirror finish is highly polished finish which makes the instruments surface very resistant to corrosion. This finish does not spot and discolor as easily as other finishes. However it reflects the light during usage and this glare can be distraction for surgeon or an obstruction to visibility.

#### Sand
This type of finish is also being used for surgical instruments which eliminates glare completely. This is attained by a sandblasting technique utilizing glass beads or silicone. This finish offer the surgeon better colour contrast because they do not reflect the color of tissues.

#### Ebonizing
It is achieved by placing the instruments in a chemical bath. It is a nonglare finish primarily used for laser surgery. This finish is a black, microscopically irregular surface which scatters and absorbs laser energy. The black or ebonized finish is achieved by dipping in a sodium salt solution and then baking in oven. It keeps the energy from bouncing off onto surrounding the intended target and damaging the healthy tissue. Surgimax has therefore abandoned this process and may only be able to offer instruments ebonized in Europe if necessary.

#### Titanium Nitride Coating
Titanium nitride coating is used to provide improved performance on surgical instruments and dental and medical implants providing an inert surface barrier that protects the products from corrosion and improves the wear resistance maintaining the integrity of the cutting edge longer. The reduced friction coefficient provided by the coating reduces the edge build-up and helps to prevents tissue from adhering to the instruments.

#### Silver Plating
Instruments or components made of copper or brass can be plated with silver by electro deposited coating. To enable the final silver deposit to adhere it will follow a primary coating of silver strike solution, nickel or copper plating. The silver plating shall not be less than 0.0010 inch in thickness. It is especially suitable on malleable instruments because the layer of silver plating is so thin that does not crack or chip when instrument is bent. Silver plating may turn black with silver oxide and may be given a good rub to get the shine back.

#### Chrome Plating
Carbon steel, copper and brass are all base metals that can be chrome plated. Finish on all edges and surfaces shall be uniform and free from burns, sharp edges (except where required), crevices, grind marks, rough areas, cracks and overflows. Chrome plating often has a layer of copper or nickel undercoat and therefore protects instruments longer from corrosion and discoloration.