Soldering, Welding and Brazing

Stainless Steel Dental Wire:

Steel is iron – carbon alloy. Stainless steel alloy is alloy of iron and carbon that contains chromium, nickel, manganese. Usually stainless steel alloy are not cast, but are used in the wrought form. They are processed in wrought form, through rolling or drawing. The corrosion resistance of stainless steel is attributed largely to the presence of chromium in the alloy. About 11% chromium is needed to produce corrosion resistance in pure iron, and the necessary proportion is increased with the addition of carbon to form steel. Chromium resists corrosion well because of the formation of a strongly adherent coating of oxide on the surface, which prevents further reaction with the metal below the surface. The formation of such an oxide layer is called passivation. The soldering of stainless steel wires requires skill, and the use of suitable materials is essential. Gold & Silver solders may be employed to form the union. Cleaning and polishing of stainless steel appliances are troublesome operations that become necessary after soldering, heat treating, or periods of service in the mouth. The appliance may be pickled in warmed nitric acid , but a gray stain finish will result that requires mechanical brushing with a fine abrasive to restore the luster of the original material.

Dental applications for cast and wrought base metal alloys are:

1. Cast titanium and titanium alloys:

a. crown and bridge.

b. partial denture frame work.

c. implant

2. Wrought titanium and titanium alloy:

a. implant

b. crown and bridge

3. Wrought stainless steel alloy: Orthodontic wires and brackets.

4. Wrought cobalt – chromium – nickel alloys: Orthodontic wires.

5. wrought nickel – titanium alloys: Orthodontic wires.

6. Wrought beta – titanium alloys: Orthodontic wires.

Soldering Operation of Wrought alloys:

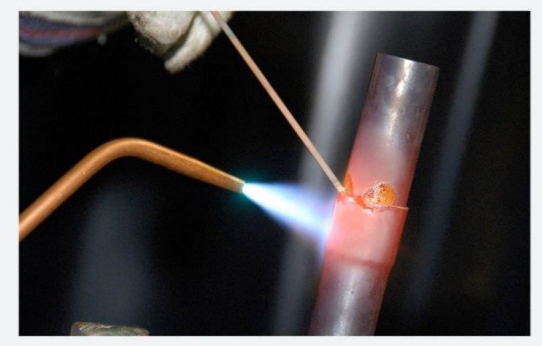
It is often necessary to construct dental appliance in two or more parts and then join them together by either a (soldering) or (welding) process.

Welding: Two pieces of metal are joined together without adding another metal, the metal pieces are heated to a high enough temperature so they attach to each other.

Soldering/Brazing: Two pieces of metal are joined by adding a third metal.

If the temperature used in the process is below 425°C, the process is called soldering.

If the temperature is above 425°C, it is called brazing.



Types of Soldering:

Solders may be divided into two major groups (soft & hard):

1.Soft Solder----Include Lead, Tin alloy, the soft solders have several properties including low fusion range about 260C or less. Soft solder cannot be used in dentistry due to the lack of corrosion resistance.
2.Hard Solder----- Have much higher melting temperature, also posses greater hardness & strength.

Two types of hard solders are used in dentistry:

1. Gold Solders----used in crown & bridge.

2. Silver Solder----used in orthodontic appliance.