COURSE NAME

MME – 102

NAME OF THE ASSIGNMENT

Materials analysis of different components of a dental brace

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Dental braces are orthodontic devices designed to mainly straighten and align our teeth. It is also used to correct bite issues and improve overall dental health. Crooked, crowded teeth, teeth fittings are also resolved using dental braces. Though usually the braces are metallic, it can be of ceramic or even plastics. But different components of the brace are made of different materials. 5 components have been chosen from a commonly used metallic brace to analyse their made-up materials.

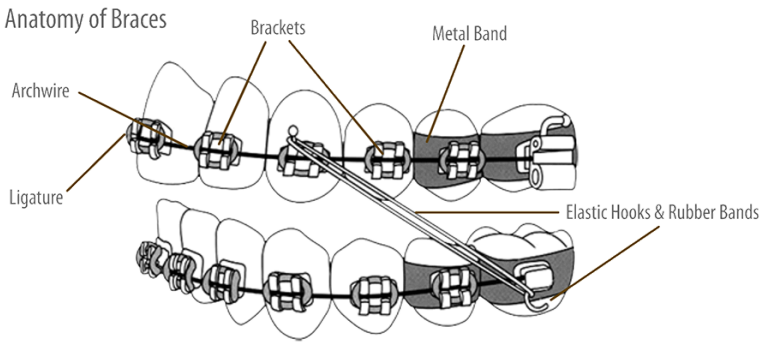
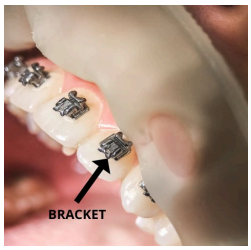


Figure: Components of a dental brace

Brackets

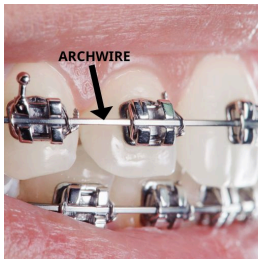


Square shaped pieces bonded in front of the teeth.

Work : To hold the archwire in place and control movement of each tooth.
Materials : Stainless steel/ Titanium, Polycrystalline alumina (PTA)

Purpose of using the material:
Biocompatibility (SS or Titanium or ceramics– all of these materials are non-reactive), lightweight, corrosion resistance, high strength.

Archwires

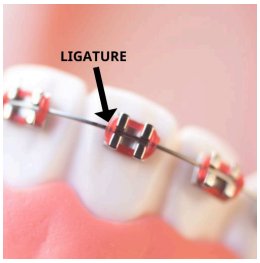


Thin metal bended wire connecting brackets.

Work : Manipulates the direction of the teeth, keeps a gentle pressure on the teeth.
Materials : Stainless steel, Nickel-Titanium alloy (Ni-Ti), Beta-Titanium (Titanium- Molybdenum- Alloy or TMA), Cobalt-Chromium alloys etc.

Purpose of using the material:
Strength, durability, corrosion resistance, shape memory qualities (Ni-Ti archwires can return to predetermined shape after deformation), moderate stiffness and flexibility, non-reactive with the foods and internal fluids.

Ligatures



Small rubber bands or wires that secure archwire to each bracket.

Work : Maintain correct position of archwire, maintain pressure on the teeth.
Materials : Elastomeric ligatures– Polyurethane, Metallic ligatures– SS, Co-Cr alloys.

Purpose of using the material:
Latex-free (these elastomeric ligatures are latex free to protect patients from latex allergies), high elasticity (polyurethane), corrosion resistance, durability.

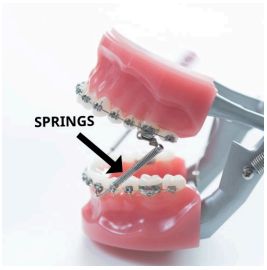
Molar Bands

Metal rings around molar teeth are considered as anchors for braces.

Work : Offers support and stability to the brace structure.
Materials : SS, Titanium, Cobalt-Chromium alloys.

Purpose of using the material:
Strength, durability, lightweight, biocompatibility, wear and corrosion resistance.

Springs



Open or closed coil springs.

Work : Push teeth closer or draw teeth apart.
Materials : Nickel-Titanium alloys (NiTi), Stainless Steel (where more force is required)

Purpose of using the material:
Shape memory properties and super elasticity (NiTi alloys), high strength, corrosion resistance, biocompatibility and durability.

Reference:
[1] https://my.clevelandclinic.org/health/treatments/24601-teeth-braces
[2] https://freyorthocenters.com/parts-of-braces/
[3] https://www.kckdirect.com/blogs/news/all-about-band-material-in-orthodontics
[4] https://pmc.ncbi.nlm.nih.gov/articles/PMC3755808/
[5] https://www.dentaltix.com/en/astar-orthodontics/short-metal-orthodontic-ligatures-400-pcs
[6] https://pmc.ncbi.nlm.nih.gov/articles/PMC10667943/
[7] https://pmc.ncbi.nlm.nih.gov/articles/PMC10626255/