**Lingualjet**

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The Lingualjet Appliance: a one-piece customized lingual bracket incorporating the straight-wire technique.

**Lingualjet Technology** has recently developed a new appliance concept including customized lingual brackets, a straight wire technique and 3D numerical processes. These technical improvements are combined into a unified bracket system by Lingualjet™ providing a highly advanced tailor-made appliance.

The principle of Lingualjet™ is built on four advanced components:

1. **A numerical set-up:** A set-up of the final positioning of the teeth is generated after obtaining 3D information of the dental arches.
2. **A custom made bracket:** The brackets are manufactured utilizing CAD/CAF technology. 3D software is used to design each individual bracket. Features include low profiles, smooth contours and special pad surface design.
3. **A flat archwire:** The archwire has a standard shape and is adjusted to fit exactly in the center of the arch slots. The archwire is fixed to one plane and results in a very precise and accurate straight wire system.
4. **3D Imaging:** As an option, the patient’s facial details can be captured via CT Scan or Cone Beam technology. A 3D image report utilizing individualized parameters can then be generated.

**The combination of these four technologies results in a unique appliance which creates many advantages. Some of these include:**

- A high degree of individualization for each patient
- The orthodontist has the freedom to adjust the clinical outcome
- The orthodontist maintains his/her preferred methods of treatment
- Ability to use standard arch wires and ligatures
- Helps to lower clinical costs
- Features combine to allow for enhanced sliding mechanics and reduced friction
- High bond strength
- Ability to combine Straightwire concepts with custom made brackets and 3D numerical technology
- Option of 3D imaging to improve diagnostic and treatment protocols

A new manufacturing process creates pierced pores of a specific geometric shape within the pads. This improves bond strength and decreases the quantity of adhesive needed near the gingiva (Fig. 3). The practitioner can begin treatment mechanics including rapid correction of rotation and dystopic positioning of the teeth without fear of the bracket loosening or debonding.

**The main objective of the system is to give the practitioner all of the clinical advantages of a reliable lingual attachment.**

1. Optimized bond strength: retention is substantially increased by the larger than normal surface area of the pad and a specific treatment of the pad, along with special design features. The pad of the bracket is manufactured to fit the lingual surface of the tooth exactly. The large surface area of the pad is designed to cover a major part of the lingual surface area of the crown. This facilitates correct positioning as well as enhances bond strengths. (Fig. 1A)

2. Control features are built into the bracket instead of the archwire: the computer generated numerical process creates a precise arch slot which incorporates the 3 orders of control. The arch slot, with a cross section of .018 x .025, is positioned so that the center is positioned more gingivally. Thus, the application point of the orthodontic force is closer to the center of resistance of the tooth, compared to techniques using standard brackets (Fig. 4). These features help to enhance treatment mechanics while taking anchorage considerations into account.

3. The bracket is adapted to each individual tooth: it takes into account the anatomy of each tooth. It works on all types of surfaces, including enamel, metal, resin, etc. By creating customized brackets with CDA technology, different geometric factors are incorporated and designed for optimal results. This includes things like the actual position of the arch slot compared to the position of the bracket relative to the pad and tooth surface.

Figure 1A: Brackets designed by CDA
Figure 1B: After bonding at levelling step
Figure 2: Comparison between Conventional and LJ Bracket
Figure 3: The LJ Pores (patent pending) avoid the composite fusing towards the gingival margin
Figure 4: The LJ bracket slot (left) is closer to the center of resistance than a conventional bracket (right)
The advantages of using a straight-wire technique with lingual brackets are obvious:

- No bending needed in the archwires
- Use of preformed archwires at each phase of treatment
- Different wire materials can be utilized
- Different wire sizes can be used
- Reduction of costs and chair time
- Better control of transverse and vertical movements
- Control of leveling and alignment without interference of the canine offsets
- Enhanced sliding mechanics
- Saves anchorage because of the reduced friction between the wire and the slots

Using transversal scanner slices, it's easy to demonstrate the justification of a lingual straightwire. Figure 5A shows that at half height of the crowns, the guide line of the arch describes a mushroom shape. Repositioning upward of the level of the arch-wire plane, an appropriate location can be found to be compatible with a standard straight wire form (Figure 5B).

Bringing the arch closer to the crown root junction eliminates the requirement for a canine off-set. This is because the difference between the palatine side of the canine and pre-molar disappears. Thus, there is no need for offset bends in the arch. Preformed arches can be made for this technique. A new arch shape has been developed, and the 3 sizes – narrow, medium and large, will cover all clinical situations.

A guide line chart is generated and will be helpful during treatment to check and control the exact position of each tooth. The crossing point between the buccolingual axis and the guide line of the wire is the same as the center of the bracket slot.

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In certain cases, the treatment could be optimized if a CT scan or a cone beam acquisition is available. In that case, a complete 3D imaging could be computerized - including 3D cephalometrics and other valuable diagnostic information.

Lingualjet achieves a high level of individualization of the apparatus using sophisticated numerical techniques. The system has already had several improvements since its introduction in 2008. The current version 2.0 offers a smaller size bracket. It is very comparable to the smallest existing version 2.0 offers a smaller size bracket. It offers a smaller size because it is smaller. The current system has already had several improvements since its introduction in 2008. The current version 2.0 offers a smaller size bracket. It is very comparable to the smallest existing version 2.0 offers a smaller size bracket. It is smaller than the smallest existing version 2.0 offers a smaller size bracket.

The benefits of Lingualjet straight-wire appliances are enhanced when TADs are added. The clinical examples cited here show some of the possibilities of Lingualjet. The appliance is constantly evolving in order to provide the practitioners who use it with ongoing innovations. The goal is to make lingual orthodontics more efficient and easier to use.

Appliance fabrication is customized for the anatomy of the patient as well as the orthodontist's treatment parameters. The practitioner chooses the desired mechanics based on the clinical situation. Different types and sizes of wires can be used based on the doctor's preferences. RMO® suggests wires such as Orthonol® (NiTi), Thermaloy® and Bendaloy® (TMA). Many sizes of wires could be used including 0.012, 0.014, 0.016, 0.018, 0.016 x 0.022, 0.017 x 0.025, etc. The clinical examples cited here show some of the possibilities of Lingualjet. The appliance is constantly evolving in order to provide the practitioners who use it with ongoing innovations. The goal is to make lingual orthodontics more efficient and easier to use. The practitioner chooses the desired mechanics based on the clinical situation. Different types and sizes of wires can be used based on the doctor's preferences. RMO® suggests wires such as Orthonol® (NiTi), Thermaloy® and Bendaloy® (TMA). Many sizes of wires could be used including 0.012, 0.014, 0.016, 0.018, 0.016 x 0.022, 0.017 x 0.025, etc.

Figures 12 A-B-C-D show how a two-wire sequence can align an upper arch. This helps to reduce chair time (wire activation takes about 5 minutes). Light forces improve the periodontal acceptance.

Anchorage can be reinforced by moving back the upper lateral sectors, substantially reducing Class II malocclusion situations as shown in Figure 13A and 13B. This result can be obtained with a straight-wire appliance because the bracket is free to slide back along the archwire.

Another situation indicating the use of TADs would be when anchorage can be saved or increased using either rigid or non-rigid connectors (Fig 14).

Conclusion:
The clinical examples cited here show some of the possibilities of Lingualjet. The appliance is constantly evolving in order to provide the practitioners who use it with ongoing innovations. The goal is to make lingual orthodontics more efficient and easier to use. The acceptable alternative to Lingualjet is self-ligating brackets, which can provide a more efficient and comfortable treatment. The advantages of Lingualjet are its ability to provide precise control of tooth movement and minimize tooth root resorption. The self-ligating brackets offer similar advantages but with the added benefit of reduced friction and irritation to the soft tissues. The choice between these two options will depend on the specific needs of the patient and the preferences of the orthodontist.