

Facebow recording

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• A facebow is an instrument that uses three-point localization by two posterior references approximating to each of the temporomandibular joints, and an anterior reference point to relate the maxillary cast vertically to the selected horizontal reference plane.

• The purpose of this is two-fold:

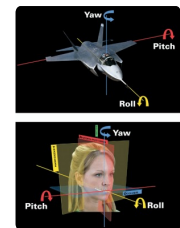
1. To relate the maxillary arch to the condylar hinge axis of the mandible in three planes of space; and
2. To position the maxillary cast on the articulator as it was when the patient was planned for surgery.

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- The facebow recording and subsequent mounting of models is a potential source of error.
- If the pitch, roll or yaw of the models is inaccurate, this will mean that the model surgery movements will differ from the planned surgical movements, even if the laboratory prescription has been followed precisely.
- It has been proposed that altering the pitch of the mounted models also changes the estimation of autorotation during model surgery.
- This latter source of error could lead to the under- or over-estimation of mandibular movement required in a bimaxillary osteotomy or the amount of maxillary advancement required in a maxillary only osteotomy.

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Pitch, Roll and Yaw



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- Various antero-posterior reference planes can be used to position the patient during assessment and align the outer bow of the facebow when recording maxillary position. These reference lines include:
- The Frankfort horizontal plane;
- The axis-orbitale plane;
- Campers plane (Ala to tragus)
- A plane connecting the external auditory canal with an arbitrary point relative to the tip of the maxillary lateral incisor.

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- Using orbitale as the anterior reference point has been shown to produce mounting errors of maxillary casts.
- The clinician can choose to position the patient in natural head position when assessing and planning for treatment.
- Natural head position was defined by Broca (1862) as 'when a man is standing and when his visual axis is horizontal, he is in natural position'.
- One most widely used method for adopting reproducible natural head position was described by Moorrees and Kearn, where subjects were instructed to sit upright on a stool and asked to look into the image of their eye in a mirror located at the same level as the pupils of their eyes.
- The use of natural head position in conjunction with the true horizontal plane can also eliminate individual and racial variations that have been associated with using the classic intracranial reference planes; this eliminating the orientation errors that occur when mounting maxillary casts to articulators.



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- Commercially available facebows include fascia bows and earbows. Fascia bows are approximately placed over the region of the condylar head after palpation.
- The styli of the fascia facebows are placed in the pre-auricular region over the condyles and are used as the reference points to the transverse horizontal axis.
- A drawback to this technique is the instability of keeping the facebow over the condylar points whilst adjustments are being made.
- Earbow facebows utilize the external auditory meatus as the posterior reference points for the transverse horizontal axis.
- This landmark stabilizes the posterior part of the facebow, simplifying the procedure. It is in close approximation (12.0–13.0 mm) to the transverse horizontal axis of the mandible, producing reasonable accuracy.



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- Current articulators have a fixed condylar height and inter-condylar axis, and mounting casts of patients with condylar asymmetry can lead to rotation of the cast and hide or introduce a false, maxillary cant.
- This distortion is a problem for surgical planning. Equally, the orbital pointer can lead to similar distortions of the mounted cast when there is orbital asymmetry



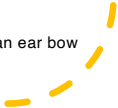
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- Spirit levels can be used to ensure that the pitch and roll of mounted maxillary casts are the same as with the patient in natural head position.
- The mounted casts then replicate more accurately the position of the teeth on the articulator, similar to that seen in the patient.



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- The current gold standard is practised in Glasgow using a purpose built fully customized facebow and articulator system that records the position of the maxilla of the patient in natural head position using spirit levels and fascia bows.
- Unfortunately, this system is not commercially available and the next best option requires addition of spirit levels to a commercially available facebow articulator system.
- The technique can be used for an ear bow or fascia bow system.



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The facebow recording

- Take accurate impressions with the orthodontic wires out at a visit prior to the facebow recording.
- This allows the technician to check if the quality of the models are of sufficient standard to perform model surgery and subsequently construct accurate surgical wafers.
- It also provides a maxillary cast that can be used to check the pitch and roll of the maxillary arch at the chairside when the facebow recording is taken.



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- For the facebow recording appointment the dental technician is present at the clinic with the dental nurse and orthodontist.
- Patients are seated upright without back support on a chair or stool facing a mirror that is level with their head and more than six feet away.
- They are then asked to look into the reflection of their eyes to adopt the natural head position. Procedure is then as follows:
- A piece of floss is placed between the glabella and the centre of the Cupid's bow of the upper lip.
- A skin marker pen is used to mark the facial midline and the relationship of the upper dental centreline to the patient's facial midline is noted by the orthodontist and technician. This is performed with reference to the model surgery prescription previously planned on the orthognathic joint clinic.



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- A retruded contact position bite is taken and overjet recorded with the bite in situ. In Class 2 malocclusions, orthodontists look closely for anterior posturing of the mandible that might underestimate the mandibular advancement needed.
- Modelling wax is then warmed and placed on a bite fork in sufficient quantity to record the full maxillary arch and retain sufficiently on the bite fork.
- Wax is used, despite its lack of stability, rather than silicone.
- This is to avoid the stone models 'bouncing' on the ultra fine fissure pattern recorded by the silicone that may not be present on the less accurate models. The wax is placed carefully so that it does not obscure the midline marker of the bite fork.



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- The bite fork is placed with the midline marker coincident with the patient's facial midline and patients are asked to seat the fork firmly using their thumbs.
- It is removed and cooled and any interferences on the wax caused by the brackets are carefully trimmed at the chairside using a wax knife.
- The bite fork is put back in the mouth to confirm the fit.
- Two simple spirit levels are placed on the outer arm of the articulator to record the anteroposterior and transverse planes.
- The facebow is positioned and fixed with spirit levels centred. The levelling of the spirit level in the transverse plane is done by adjusting the seating of one of the ear rods in the external auditory canal.



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- Once the facebow recording has been taken using this technique the maxillary model can be placed in the articulator at chairside to assess the pitch, roll and yaw of the maxilla.
- This adds to the diagnosis and can help to inform the patient better of the procedure involved.



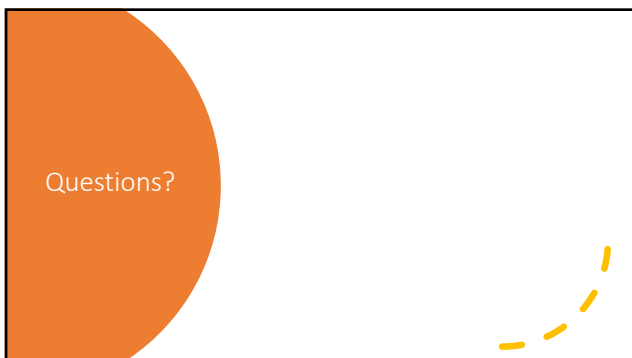
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- In patients with uneven heights of the external ear, the outer bow is removed from the external ear canal on the abnormal side.
- The transfer jig assembly is then used to transfer the recorded maxillary position onto the articulator in the clinic whilst the patient is still present.
- The orthodontist and technician can then confirm if any gross maxillary occlusal cant is present.
- If this stage in the diagnosis confirms a significant undiagnosed cant, the surgeon will be consulted as to whether or not correction of this should be prescribed for the model surgery.
- Minor lateral shifts of the dental centreline on the articulator can be observed if the ear rods are not equally positioned relative to the patient's mid sagittal plane



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Questions?



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