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Matrix system

In operative dentistry

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B.D.S Degree

By

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Dedication

To my mother ...

To my father ...

To my sisters ...

To my friends ...

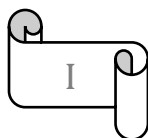
I hope that this achievement will complete the dream that you had for me these many years ago, when you chose to give me the best education you could.

Acknowledgement

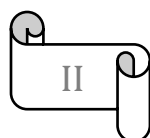
Thanks to **Allah the Almighty** for giving me the power to achieve this work and I pray that his blessing upon me may continue throughout my life.

I would like to express deepest thanks to my supervisor **Assist. Prof. Dr. Alaa Jawad** for her advices, guidance, and unlimited cooperation in supporting my study.

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Introduction

A **dental matrix band** can be defined as “a properly shaped piece of metal, or other material, temporarily inserted to support and to give form to the restoration during placement and hardening of the restorative material,” with the re-creation of natural tooth shape and interproximal contact position as the ultimate objective.

The primary function of a matrix (band) has been to compensate for missing walls and thus provide containment of the filling material to restore the shape and the normal anatomy and morphology of the tooth.(**Loomans BAC. 2006**)



Interproximal Surfaces and Contact Areas:

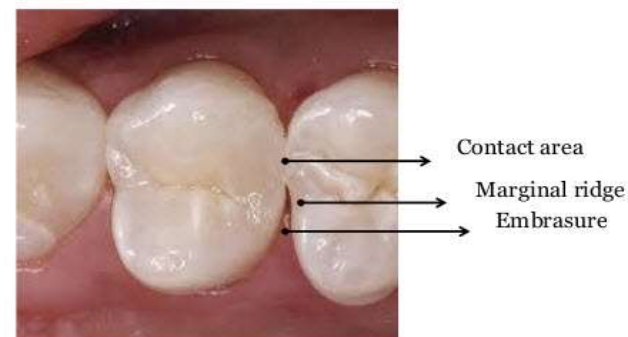
“**surface area where the proximal faces of neighboring teeth come in contact.**”

The function of a satisfactory (tight) proximal contact surface

Under physiological conditions, teeth are stabilized in the dental arch by making occlusal contacts with opposing teeth

and proximal contacts with adjacent teeth.

1. Interproximal contact has been defined as the area of a tooth that is in close association, connection or touch with an adjacent tooth in the same arch. (**Andrews LF 1972**)
2. The proper proximal contact plays an important role in the stability and maintenance of the integrity of the dental arches. (**Wheeler RC.1969**)
3. However, a weak or slightly open proximal tooth contact would permit food impaction and cause subsequent dental caries, halitosis, periodontal disease, or drifting of



teeth. On the other hand, excessive proximal tooth contact would result in wedging of teeth and undesirable tooth movement and trauma of periodontium. (**Sluder TB.1985**)

If proximal and contact areas are not properly restored they may cause the following important damages. (**Shennib HA, Wilson NH. 1986**)

- a. Food impaction leading to recurrent caries.
- b. Injury to the periodontium
- c. Displacement of teeth
- d. Disturbed balanced occlusion and intercuspal relations
- e. Rotation and migration of teeth.

1.Components of Matrix Systems

1.1 Matrices or Bands.

1.2 Wedges

1.1Matrices or Bands.

It was introduced in the year 1871 by Dr. Louis jack matrix band have a major role in creating margin of the restoration especially at gingival margin area. Improper placement of matrix and wedges can result in poor contours or contacts, overhangs or weakness resulting from poorly condensed restorative material. This will lead to further periodontal problems and carious lesions will occur. . (Qualtrough AJE, Wilson NHF.1992)

1.1.1 Materials used to Fabricate Bands

- Stainless Steel
- Copper Band
- Poly Acetate Mylar Band
- Cellulose Acetate (Cellophane)
- Cellulose Nitrate(Celluloid)

1.1.2 Parts Of A Matrix System

Matrix is formed of two part

- Band which is a piece of metal, celluloid or polymeric material used to support and give form to the restorative material during its introduction and hardening. (Heymann HO, Swift EJ Jr, Ritter AV.2013)
- Retainer is a device by which the band can be retained in its designated position and shape. This could be a mechanical device, a wire, dental floss and or compound. . (Heymann HO, Swift EJ Jr, Ritter AV.2013)



To buildup ideal contact, a knowledge of ideal tooth form of interproximal area is essential which in brief is as follows.(Klein F, Keller AK, Staehle HJ, Dorfer CE. 2002)

1. Interproximal embrasures are extending on all the four sides with definite shape around each contact area. Four embrasures are occlusal, lingual, gingival and facial (buccal/labial).
2. Anterior teeth have marble contacts with less pronounced embrasures than posteriors having ball to ball contact.
3. There is a perfect triangular interproximal space between the adjacent teeth. The apex of the triangle is the contact area. This triangle gradually widens out in all the four directions, occlusal, lingual, gingival and facial (buccal/labial). The apex is always at the contact area and base towards the outer surface.
4. The base of the triangle of interproximal space is at alveolar border, while apex is a contact area.

1.1.3 OBJECTIVES OF A MATRIX BAND

1. Should act as a temporary wall of resistance during introduction of the restoration material.
2. Should provide shape to the restoration
3. Should confine the restoration within acceptable physiological limits
4. Must assist in isolating the gingiva and rubber dam during introduction of restoration material.
5. Help in maintaining dry operation field to prevent contamination of rest material. **(Loomans BAC.2006)**

1.1.4 Requirements Of A Matrix Band

1. Rigidity: The matrix band should be rigid enough to withstand the condensation pressure applied during introduction of restoration in the plastic state, and maintain its shape during hardening.
2. Versatility: The matrix band should be able to conform to almost any size and shape of tooth.

3. Comfortable to use: The band should not cause any difficulty to the patient, or hindrance to the operator during condensation. It should displace the gingiva (without injuring) and rubber dam for ease in working.

4. Height and contour: The matrix band should not extend more than 2 mm beyond the occluso-gingival height of the crown of tooth. This facilitates vision and speeds up working. The matrix band helps in formation of a physiologic proximal contact relationship.

5. Application: The matrix band should be such that it can be applied and removed easily. It should be easy to sterilize. (**Shennib HA, Wilson NH. 1986**)

1.1.5 MATRICES FOR CL II CAVITY PREPARATION

1.1.5.1 Ivory no.1 (Unilateral CL II Matrix band)

Bands 0.0015 – 0.002 in (38 - 76 μ m) made of brass, shim steel ,carbon or steel in various sizes and shapes. (Kaplan I, Schuman NJ.1986)

- Band contoured with ovoid burnished or contouring pliers
- Wedge was placed
- previously compound was also placed.

Indications

For restoring a unilateral class11 cavity especially when the contact on the unprepared side is very tight

Advantages

- Economical
- Can be sterilized

Disadvantage

- Difficult to apply & remove (Kaplan I, Schuman NJ.1986)



1.1.5.2 Ivory No.8

Ivory matrix band retainer introduced in 1905 is used to hold the matrix band to provide missing part of the walls on both proximal sides (MOD cavity) and class II compound cavities having missing walls on more than two surfaces on posterior teeth (MOB, MOL, DOB, DOL, MODL, MODB, and MODBL). This retainer provides missing walls by encircling entire crown of the tooth. The matrix band is made up of thin sheet of metal so that it can pass through the contact area of the uncut proximal side of the tooth. (Circumferential CL II Matrix Band, Bilateral(MOD) (**Kaplan I, Schuman NJ.1986**))

Advantages:

1. Economical
2. Used for] restoring class II tooth preparations
3. Can be sterilized (autoclave)

Disadvantage:

1. Cumbersome to apply and remove.
2. Uncomfortable fro patient.



1.1.5.3 Tofflemire Universal

The most popular matrix used for cl II cavities .It is rigid easy to use and provide good contact for amalgam restorations but main disadvantage Designed so that band could be easily removed from the thumb screw retainer. Band of stainless steel 0.0015-0.003 inch (38 - 76µm) and is accurate. with contouring pliers and burnished after matrix placed. The non contoured band can be shaped with a ball

burnisher; first a smaller one and then a larger burnisher or a Clark's triplex contouring pliers. (Theodore M. Roberson, Harald O. Heymann, Edward J. Swift, 2013)

Advantages:

1. can be used both from facial as well as from lingual side.
2. economical
3. sturdy and stable in nature -provides good contact and contours
4. can be easily removed useful when there is MOD cavity -can be sterilized (autoclave)

Disadvantages

1. Difficult to adapt in teeth with less sufficient tooth structure Uncomfortable for patient
2. do not provide optimal contour for composite restorations and not useful for extensive CL II cavities. (Kaplan I, Schuman NJ.1986)



1.1.5.4 Compound-supported matrix (Custom Matrix or Anatomical matrix)

It is used when more than one surface is involved. Entirely handmade band, usually supported by impression compound facially and lingually, very rigid, strong. main disadvantage is time consuming and. (Khera SC, Swift EJ.1988)

Indication:

1. for restoring class II cavities involving one or both proximal surfaces.
2. For complex situations like pin amalgam restoration.

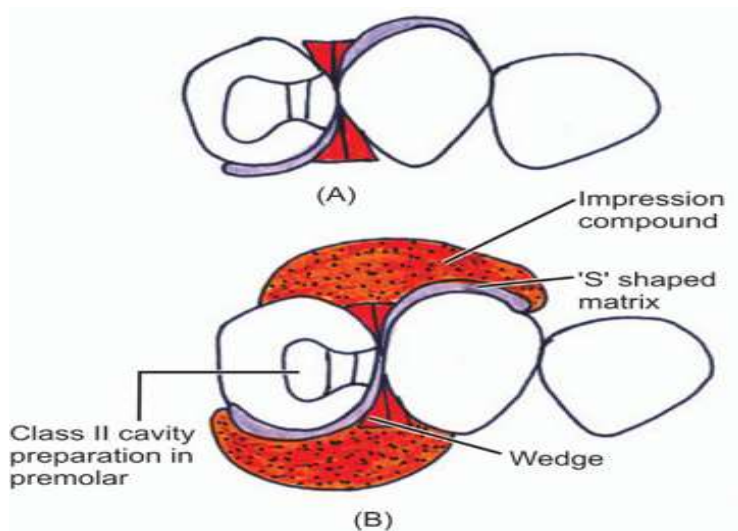
Advantages:

- 1.Highly rigid and stable.
- 2.Provide good access and visibility for placing the restoration.
- 3.Most efficient means of reproducing contact and contour.

Disadvantage:

- 1.Time consuming.
2. discomfort

Note: Not used nowadays.



1.1.5.5 T-Band Matrix

It is either straight or curved copper or stainless steel matrix bands are used with the long arm of the T surrounding the tooth and overlapping the short arm of the T. Wedges and impression compound may be used to provide stability. It is without retainer stainless steel. **(Kaplan I, Schuman N.1986)**

Indications

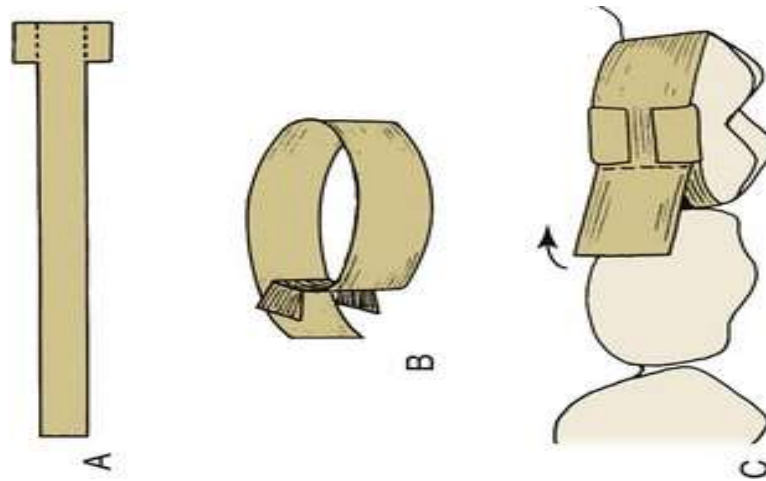
For restoring class II cavities involving one or both the proximal surfaces of a posterior tooth.

Advantages

- Simple and inexpensive matrix
- system Rapid and easy to apply.

Disadvantages

- Flimsy in structure, not very stable



1.1.5.6 Copper Band Matrix

Cylindrical shape, can be heated and quenched in water to modify the shape and the cervical portion can be modified by scissor to accommodate gingival margin usually used with endodontically badly broken teeth and can be polished and maintained in position (usually GI used as temporary restoration) until the final treatment. It is used without Retainer. **(Graham DA, Pelzner RB, Birtcil RF Jr. 1980).**

For mesio-occlusodistal compound cavities and complex cavities assorted copper or stainless steel full circle or ring bands ranging in size from 1 to 20 are also used. Once the proper size is selected it can be contoured using pliers and trimmed by cutting pliers and finished by finishing stones, after it has been softened by heating to a red hot state and quenching in water. Proximal contact of the band may be thinned using a small round fine grinding stone. Wedges may be used to stabilize the band. After condensation is complete, the band can be cut by means of a bur at the same or the next day. Sometimes stainless steel bands made according to tooth size may also be used if spotwelding facility is at hand. **(Rutsky PP. 1968)**

Indication:

1. For MOD and complex restorations.
2. usually used for amalgam fillings involving more than two surfaces

Advantages:

provide excellent contour

Disadvantages

time consuming



1.1.5.7 Auto Matrix (Without Retainer) available in narrow, medium, wide, usually come with tightening device (Automate) and nipper, used for complex restorations. The AutoMatrix system allows matrix placement and retention without the need for bulky retainers, allowing for ease of placement, better access, clear view of the operating field and greater patient comfort.

- The single use, circumferential AutoMatrix system bands allow proper subgingival and proximal adaptation.
- The AutoMatrix system matrices are available in four height/width and thickness configurations. All AutoMatrix system matrix sizes fit teeth of any circumference.

- The AutoMatrix is a unique matrix band system used to facilitate the placement of direct multi-surface restorations. There are four different pre-assembled matrix bands available to clinicians. Selection of a suitable matrix band depends on the crown height of the prepared tooth and the amount of interproximal space required to be closed to ensure a tight contact point.

while holding the band in place with firm finger pressure, tighten the AutoMatrix with Automate III Tightening Device by turning handle clockwise until two-to-three clicks are heard. Remove the tightening device by **rotating handle counter-clockwise**. Place wedges interproximally as required and burnish contacts point/s. (Sidelsky H. 2010)

Advantages:

1. Auto lock loop can be positioned either on the facial or lingual surfaces with ease.
2. Improved visibility because of absence of retainer
3. Can be positioned either on the facial or lingual surfaces with equal ease

Disadvantages:

1. Bands are not precontoured and development of physiological proximal contours is difficult.
2. Indicated for extensive class II preparations especially when two or more cusps have to be replaced.
3. Bands are not precontoured so proximal contouring is difficult



1.1.5.8 Sectional Matrix

Mostly used Bands now days for CL II amalgam and composite restoration, a preformed bands a piece of metal or transparent material (Bioclear Co.) used in combination with a ring retainer or without (ex:Bioclear bands for anterior teeth) and wedge (reflective wedge in case of composite restorations) for a good contouring and easy of placement.

The sectional matrix is the **best way to achieve a strong contact point in Class II restorations with composite resin** in the posterior dental sector. The pre-wedging is essential to get a separation between teeth which avoid the matrix deformation during its insertion. (Ireland EJ. 1985)

ADVANTAGES:

They provide tooth separation to ensure good interproximal contacts

DISADVANTAGES:

1. ring provides progressive tooth separation if It is left for a longer time -they simplify matrix placement to single proximal surface restoration as compared to circumferential band.

2. as it is made up of "dead soft metal" so heavy burnishing wlvecto be formed in the matrix that will replicated in the restoration.

provide a longer, tighter. contact in resin-composite than does a standard at in a tofflemice retainer. (Ireland EJ. 1985)



Note :A sectional matrix system, such as Walser, is an excellent choice for Class 2 composite restorations for many reasons. The matrix band is anatomically correct,

and the unique design of the matrix allows for the proper restoration of interproximal anatomy as described. Also, the many matrix designs in the Walser system allow for accurate matrix fit for anterior Class 3 and 4 restorations, premolars, molars, and adjacent (back-to-back) proximal surfaces as well.(5/6 LL)

1.1.5.9 Siqviland matrix system

One side of matrix retainer has latch and lock Other side is flat and should face towards cheeks Then we thread the matrix band through the latch And then thread in between the locks. **(Kaplan I, Schuman NJ.1986)**

Advantages:

- 1- Can adopt to tooth contour properly
- 2- Less bulkier than tofflemire due to its self adjusting holder anatomic adaptation of band is possible without the help of wedge Each band has a coil like autolock loop.



1.1.5.10 The NS Matrix System

The NS matrix is a highly effective and economical matrix system that can be used for a variety of clinical applications, including posterior and anterior restorations .

Application Instruction

Prepare the tooth for restoration. Select the proper matrix band size . Insert the retainer in welded tab of matrix band by pressing it with finger . Slip the band over the tooth, positioning the welded tab either mesially or distally, depending on accessibility, type of carious lesion, and mouth condition of patient.

Using woody wedges, wedge the matrix band to produce and maintain proper separation and to hold the matrix tightly over the gingival margin of the restoration. You will find the band is flexible enough to make a good fit, yet sturdy enough to provide the support needed for the restoration. Complete the restoration procedure. To remove the band, then gently slide the smooth end from between the teeth in an occlusal direction while drawing the band in a buccal or lingual direction. .(**Kaplan I, Schuman N. 1986**)

Advantages

1. Can fabricate on chairside.
2. Minimal thickness of band (0.0015", 0.04 mm) for easy adaptation to tooth.
3. Two-step installation-place and wedge.
4. Use for any general restorative procedure.
5. Creates anatomical contours, even with a wide interproximal preparation.
6. Cost-effective.
7. Retainer not obstructs the field .(**Kaplan I, Schuman N. 1986**)



1.1.5.11 Ready Made Pinch Bands (Garrison co.):



Pinch transparent

Pinch Metal

1.1.5.12 Retainerless Walser Filling Matrix

It is designed, for fitting and removal within a few seconds. It is durable and sterilizable. It fits tightly and safely while automatically adapting to conical tooth shapes. It does not require any screws or spanners. Patients can close their mouths and bite when the matrix is in place, hence occlusal carving can be done without removing it. Along with matrix it is also suitable for use as a cotton wool roll holder. The matrix is available in 27 sizes, with blade heights ranging from 5 to 8 mm and thickness of 0.05 mm. The matrix comes in sets of 10, 18, and 25 matrices with forceps and sterilizing tray.

Note 2: Circumferential matrix systems that provide an ideal proximal contact for amalgam restorations are often not much suitable when used with composites and may lead to flat proximal surfaces and occlusal shifting of contact area with them.(R/P) (**Ireland EJ. 1985**)



1.1.6 Matrices for Class III Direct Tooth Colored Restorations

1.1.6.1 Plastic matrix strip

These are transparent matrix strips. Celluloid (Cellulose nitrate) strips are used for silicate cements and cellophane (Cellulose acetate) strips are used for resins.

(Meyer A.1987)



1.1.6.2 Mylar strips

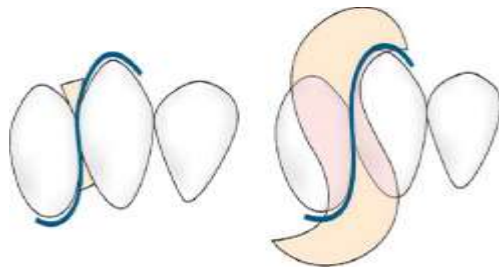
Mylar strip may be used for composite and silicate restorations. The matrix strip (plastic/ mylar) is burnished over the end of a steel instrument, e.g. a tweezer handle, to produce a 'belly' in the strip. The curvature that is formed allows for reproduction of proper contour and contact of the natural tooth.

(Mullejans R, Badawi MO, Raab WH, Lang H. 2003)



1.1.6.3 S-Shaped Bands

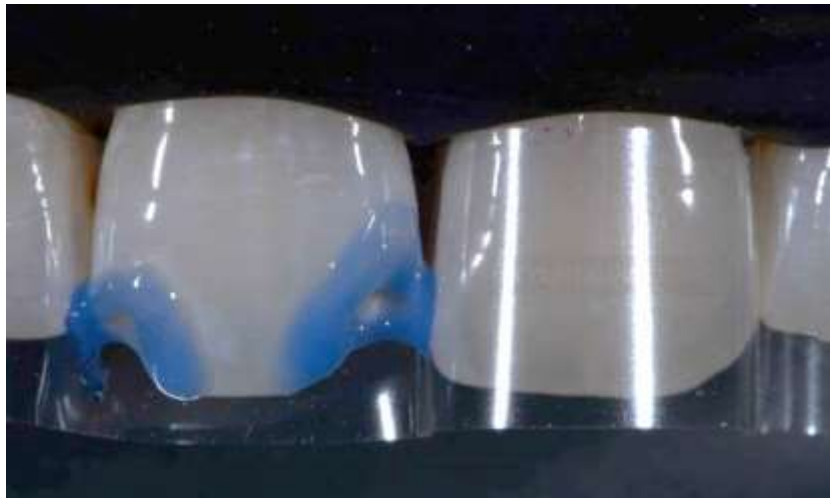
Usually used for anterior teeth CL III Composite restorations. This is ideally used for restoring distal part of canine and premolar. A normal stainless steel matrix band is taken and shaped like 'S' by means of a mouth mirror handle. The contoured strip is placed interproximally over the facial surface of tooth and lingual surface of bicuspid (in cases for lingual approach preparation) wedge and impression compound are used to provide stability . (Mullejans R, Badawi MO, Raab WH, Lang H. 2003)



1.1.7 Matrices for Class IV Direct Tooth Colored Restoration

1.1.7.1 Plastic strip

For inciso-proximal cavities, the strip is folded in 'L-Shape'. The matrix is measured and cut so that one side is as wide as the length of the tooth and the other side is as wide as the width of the tooth. A wedge is used to help in adaptation of the strip. The angle formed when the strip is folded should approximate the tooth corner and support the matrix on the lingual surface (which is held by forefinger of the left hand). The cavity is filled to slight excess and one end of the strip is brought across the proximal surface of the filled tooth. The other end of the strip is folded over the incisal edge. The matrix is held with the thumb of the left hand till the initial setting or curing takes place. (Ireland EJ. 1985)



1.1.7.2 Aluminium foil incisal corner matrix

These are shaped according to the angles and surfaces of anterior teeth and are prefabricated 'Stock' metallic matrices. They are used for restoring proximo-incisal corners and surfaces of anterior teeth, adapting to specific cases. They cannot be used for light cured resin material. (Khera SC, Swift EJ. 1988)

1.1.7.3 Transparent crown form matrices

These are 'Stock' plastic crowns and can be adapted to tooth anatomy. The entire crown is used for bilateral class IV preparation mesio-inciso-distal (MID). For unilateral class IV the plastic crown is cut incisogingivally to use one half of the crown according to the side of restoration . **(Khera SC, Swift EJ. 1988)**



1.1.8 Matrices for class V, VI and VII cavity preparations for direct tooth-colored restorations.

1.1.8.1 Prefabricated plastic matrices

They are used in light cured restorations and are available in different sizes. A handle is present to hold the matrix in place till it sets.



1.1.8.2 Anatomic matrix

Anatomic matrix is fabricated as described for class IV cavities. Study cast of defective tooth/teeth with at least one intact tooth on each side is made. After restoring the defects on the cast, a plastic template is prepared. The template is cut all around, keeping it at least 1 mm beyond the defects. After being trimmed gingivally it is used as a matrix for applying pressure on restorative material while it is being cured. for light and non-light cured, direct tooth-colored materials. (Ingraham R, Koser JR. 1955)

1.1.8.3 Aluminium or copper collars

These are pre-shaped according to the gingival third of the buccal and lingual surfaces. They can be adjusted to specific cases to cover 1 to 2 mm of the tooth surface circumferential to the cavity margins. They are then mounted on the tip of a softened stick of compound, being used as a handle. Fill the cavity with restorative materials and apply. for non-light cured tooth colored restorations. the adjusted collar onto the tooth till the initial setting is over. (Ingraham R, Koser JR. 1955)

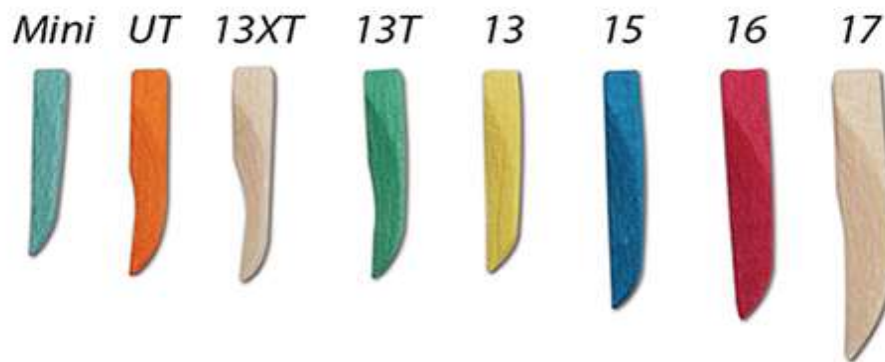


1.1.8.4 Window Type Matrix: for CL V Composite Restorations



1.2 Wedges

Small tapering Pieces of plastic or wood either (Triangular or rounded), (with fins or without fins) inserted in the gingival embrasure either lingually, palatally or facially beside the matrix band to prevent the overhang during condensation / injecting of the restoration and to confirm the contour of the tooth and provide some degree of separation. **(Ireland EJ.1985)**



Number designates wedge length in mm (13=13mm)

WEDGES (SEPARATORS)

For immediate separation of teeth prior to restoration, wedges or separators are used.

Movement of teeth may be required for the following.

1. To make them restorable by moving them in a desired physiologic position.
2. By intruding or extruding teeth to make them restorable.
3. To close space between them to promote a balanced and esthetically pleasing arch form.
4. To allow space for the thickness of the matrix band. **(Ireland EJ.1985)**

1.2.1 Functions of Wedges:

- A. Wedges separate the teeth.
- B. They depress the interproximal soft tissues thus minimizing trauma.
- C. Protect the dam and soft tissue from injury.
- D. Assure close adaptability and stabilization of matrix band to the tooth.
- E. Produce separation of the teeth to help compensate for the matrix thickness.
- F. Prevent gingival 'overhang' of the restoration. **(Ireland EJ.1985)**

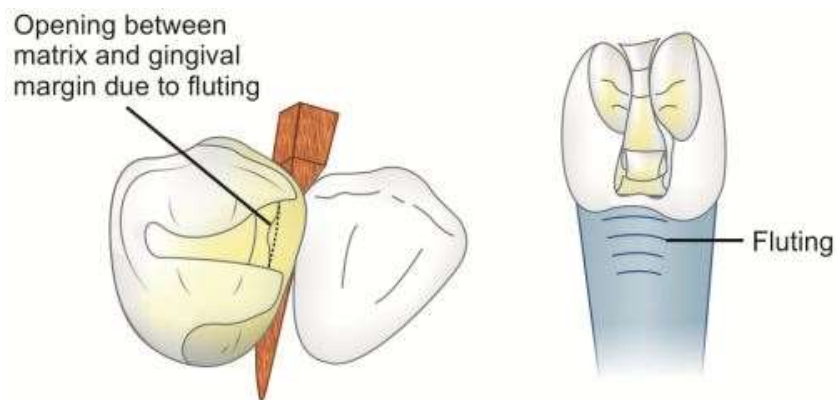


1.2.2 Types of placements:

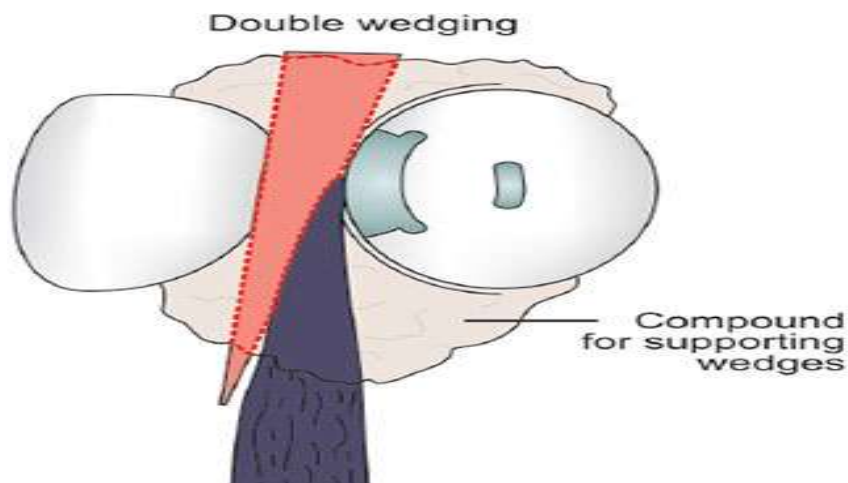
if the wedge is placed occlusal to the gingival margin, the band will be pressed into the preparation, creating an abnormal concavity in the proximal surface of the restoration. The wedge should not be so far apical to the gingival margin that the band will not be held tightly against the gingival margin. This improper wedge placement will result in gingival excess caused by the band moving slightly away from the margin during condensation of the amalgam. Such an overhang often goes undetected and may result in irritation of the gingival or an area of plaque accumulation. **(Ireland EJ.1985)**

1.2.2.1 Piggy Back Wedge If the wedge is significantly apical of the gingival margin, a second (usually smaller) wedge may be placed on top of the first to wedge adequately the matrix against the margin. This type of wedging is particularly useful for patients whose interproximal tissue level has receded.

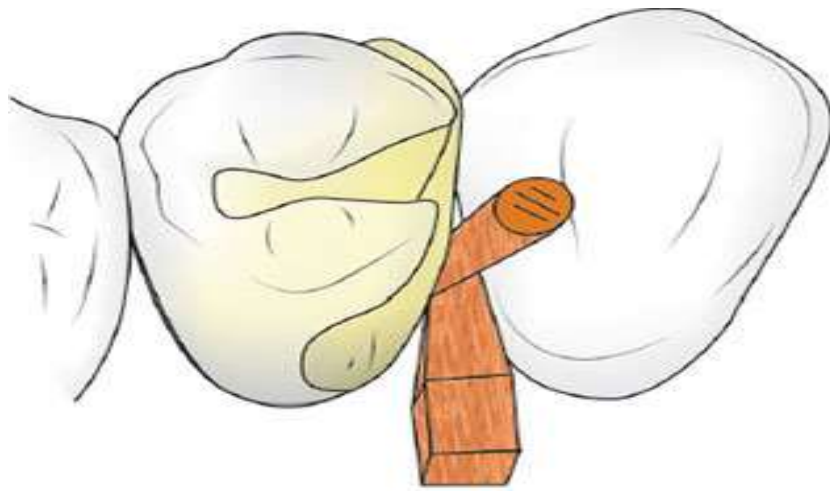
- Done when the wedge is significantly apical of the gingival margin
- A smaller wedge is piggy backed on the first
- This method is useful in patients with recession of the interproximal tissue level



1.2.2.2 Double Wedging Indication: - Double wedging is permitted (if access allows,) securing the matrix when the proximal box is wide faciolingually. Double wedging refers to using two wedges: one from the lingual embrasure and one from facial embrasure. Two wedges help to ensure that the gingival corner of the wide proximal box can be properly condensed. (Qualtrough AJE, Wilson NHF.1992)



1.2.2.3 Wedge Wedging: - Occasionally concavity may be present on the proximal surface that is apparent in the gingival margin. This may occur on a surface with a fluted root such as the mesial surface of the maxillary 1st premolar. A gingival margin located in this area may be concave. To wedge a matrix band tightly against such a margin a second pointed wedge can be inserted between the 1st wedge and the band. This is referred as wedge wedging. The wedging action between the teeth should provide enough separation to compensate for the thickness of the matrix band. This will ensure a positive contact relationship after the matrix is removed.



Wedge wedging

Two wedges one from the lingual and other from the facial embrasure used in restoration for wide proximal restorations. **(Qualtrough AJE, Wilson NHF.1992)**

- Done when a concavity may be present on the proximal surface
- A second pointed wedge can be inserted between the first wedge and the band

Rapid or Immediate Separation It is a quick and clinically useful method but if excessively used may produce pain due to rupture of the periodontal ligament fibers hence it should be avoided. Separation works on the following two principles.**(Qualtrough AJE, Wilson NHF. 1991)**

- Traction Principle
- Wedge Principle

Examples of separators working on ‘Traction principle’ are as follows:

- a. Non-interfering true separator—It is used when continuous stabilized separation is required. The separation can be adjusted as per requirement and is shared by adjacent teeth. It does not interfere with occlusion and functions of teeth .
- b. Ferrier single or double bow separator
- d. Wood ward separator
- e. Perry separator
- f. Dentatus nystrom separator
- g. Parr’s universal separator. (**Qualtrough AJE, Wilson NHF.1992**)

References

A

- ❖ Andrews LF. The six keys to normal occlusion. *Am J Ortho* 1972;62:296-309.

B

- ❖ Bauer JG, Crispin BJ. Evolution of the matrix for Class 2 restorations. *Oper Dent*. 1986;(Suppl4):1-37.
- ❖ Bharath Subin. Creating Tight, Anatomically Correct Interproximal. A Review of Alternative Methods: Paper presented at XVII FODI and X IES Conf. Mangalore, Nov. 2002.

C

- ❖ Chan DCN. Custom matrix adaptation with elastic cords. *Oper Dent* 2001;26:419.

E

- ❖ El-Badrawy WA, Leung BW, El-Mowafy O, Rubo JH, Rubo MH. Evaluation of proximal contacts of posterior composite restorations with 4 placement techniques. *J Can Dent Assoc*, 2003 Mar;69(3):162-7.

F

- ❖ FenderWedge and FenderMate: a new standard for Class II preparations. *Inside Dent*. 2008;4(9).
[https://www.dentalaegis.com/id/2008/10/fenderwedge-and-fendermate-a-newstandard-](https://www.dentalaegis.com/id/2008/10/fenderwedge-and-fendermate-a-newstandard-for-class-ii-preparations) for-class-ii-preparations. Accessed June 14, 2016.

G

- ❖ Graham DA, Daniels JA, Kahl EA, Pelzner RB, Birtcil RF Jr. Pre-contoured Matrix Bands for Class II Amalgam Restorations. *Gen Dent* 1980;28:52-7.

H

- ❖ Heymann HO, Swift EJ Jr, Ritter AV. *Sturdevant's Art and Science of Operative Dentistry*. 6th ed. St Louis: Elsevier/Mosby; 2013.

I

- ❖ I Anand. Sh. *Essentials of Operative Dentistry 1st ed. Elsevier/Mosby; 2010*
- ❖ Ingraham R, Koser JR. The Anatomic Matrix. *J Am Dent Assoc* 1955;51:590-3.
- ❖ Ireland EJ. Evaluation of a new matrix band and wedge for amalgam preparations having lingual or facial extension. *Gen Dent* 1985;33: 434.

J

- ❖ James B Summit, J.W. Robbins, Richard S Schwartz, *Fundamentals of operative Dentistry a contemporary approach; Second Edition.*

K

- ❖ Kampouropoulos D, Paximada C, Loukidis M, Kakaboura A. The influence of matrix type on the proximal contact in Class II resin composite restorations. *Oper Dent*. 2010;35(4):454-462.
- ❖ Kaplan I, Schuman N. Selecting a matrix for a class II amalgam Testoration. *J Prosthetic Dent* 1986;56:25-31.
- ❖ Kaplan I, Schuman NJ. Selecting a matrix for class II amalgam restoration. *JPD* 1986;56:25.
- ❖ Khera SC, Swift EJ. Custom Matrix Adaptation for Concavities along Cavosurface Margins. *Compendium* 1988;3:171-6.
- ❖ Klein F, Keller AK, Staehle HJ, Dorfer CE. Proximal contact formation with different restorative materials and techniques. *Am J Dent*, 2002 Aug;15(4):232-5.
- ❖ Kucey BK. Matrices in metal ceramics. *JPD* 1990;63:32.

L

- ❖ Leibenberg WH. The proximal precinct in direct composite restorations: interproximal integrity. *Pract Proced Aesthet Dent*. 2002;14(7):587-594.
- ❖ Loomans BAC. *Proximal Contact Tightness of Posterior Composite Resin Restorations* [dissertation]. Nijmegen, the Netherlands: Radboud University; 2006.
- ❖ Lopes GC, Vieira LC, Araujo E. Direct composite resin restorations: a review of some clinical procedures to achieve predictable results in posterior teeth. *J Esthet Restor Dent*. 2004;16(1):19-32.
- ❖ Lowe RA. Recreating nature using today's composite materials. *Restorative Quarterly*. 2000;3(1):3-10.

M

- ❖ Meyer A. Proposed criteria for matrices. *Can Dent Assoc* 1987 1:851-53
- ❖ Meyer A. Proposed criteria for matrices. *J Can Dent Assoc* 1987;53:851.
- ❖ Mullejans R, Badawi MO, Raab WH, Lang H. An in vitro comparison of metal and transparent matrices used for bonded class III resin composite restorations. *Oper Dent*. 2003 Mar-Apr;28(2):122-6,

N

- ❖ Predictable Interproximal Contacts in Class II Composite Restorations (online) 2010 (cited 2012 Sep 28). Available from: URL: <http://www.fordentists.com/clinical/restorative/predictable-interproximal-contacts-class-ii-composite-restorations>.

Q

- ❖ Qualtrough AJE, Wilson NHF. The History, Development and Use of Interproximal Wedges in Clinical Practice. *Dent Update* 1991:66-70.
- ❖ Qualtrough AJE, Wilson NHF. The history, development and use of interproximal wedges in clinical practice. *Dent Update* 1992;19: 284.

R

- ❖ Rada RE. Achieving anatomic proximal contacts with direct composite resin restorations. *Dent Today*. 2000 Mar;19(3):46-50.
- ❖ Raghu R, Srinivasan R. Optimizing tooth form with direct posterior composite restorations. *J Conserv Dent*. 2011; 14(4): 330-36
- ❖ Rutsky PP. Matrices for Compound Cavities. *J Am Dent Assoc* 1968;76:1006-10.

S

- ❖ Shennib HA, Wilson NH. An investigation of the adequacy of interproximal matrices commonly used with posterior composite restoratives. *J Dent* 1986;14:84.
- ❖ Sidelsky H. Resin composite contours. *Br Dent J*. 2010;208(9):395-401.
- ❖ Sluder TB. Clinical dental anatomy, histology, physiology and occlusion. In: Sturdevant CM, ed. *The art and science of operative dentistry*, 2nd ed. New York: McGraw-Hill: 1985:21

T

- ❖ Theodore M. Roberson, Harald O. Heymann, Edward J. Swift, Sturdevant's *Art and Science of Operative Dentistry*; Fifth edition

W

- ❖ Wheeler RC. *An atlas of tooth form*, 4th ed. Philadelphia, W.B. Saunders Co; 1969:12.
- ❖ Woodmansey KF. Replacing compound with resin composite for quick and efficient matrices. *JADA* 1998;129:1601.