

Basic Concepts of CAD/CAM Inlays for Clinical Application

The Japanese Society of Conservative Dentistry (JSCD) April 2026

1. Introduction

Computer-aided design/computer-aided manufacturing crown restorations (CAD/CAM crowns) were first covered by the Japanese national health insurance system in 2014. Subsequently, in 2022, CAD/CAM inlays were included in the insurance system. CAD/CAM inlays represent an indirect restorative option that responds to areas that are difficult to restore with the direct restoration, patients' esthetic demands and the recent trend toward digital dentistry.

The Japanese Society of Conservative Dentistry released this technical guideline to disseminate appropriate clinical application for the CAD/CAM inlay restorations.

2. Definition of a CAD/CAM Inlay

- CAD (Computer-Aided Design): computer-assisted design of the restoration
 - CAM (Computer-Aided Manufacturing): computer-assisted milling or fabrication of the restoration
- A CAD/CAM inlay is a dental inlay that is designed and fabricated using a dental CAD/CAM system

3. Indicated Cases

Limited to complex cavities involving the proximal surfaces of premolars and molars:

- Use in premolars
- Use in molars
- Use in primary molars with congenitally missing permanent successors

Not recommended in the following cases:

- Cases involving premolars and molars subjected to high occlusal loads
- Cases involving premolars and molars in patients with habitual bruxism
- Cases which cannot meet the criteria for cavity preparation (see Figs 1 - 6)

4. Key Points for Cavity Preparation in CAD/CAM Inlays

- 1) Round all line angles and point angles within the cavity (Fig. 1).

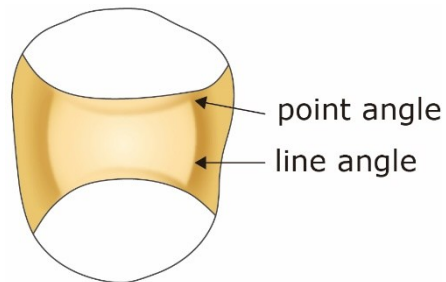


Fig. 1 Line and point angle

- 2) Avoid placing the margin in contact with opposing or adjacent teeth (Fig. 2).

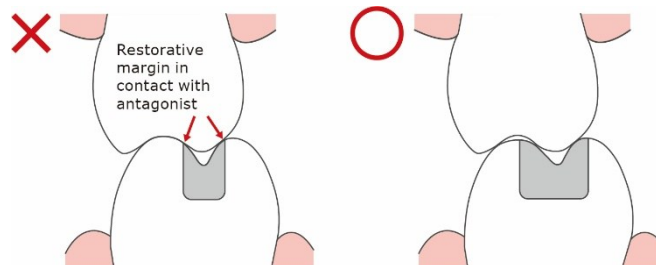
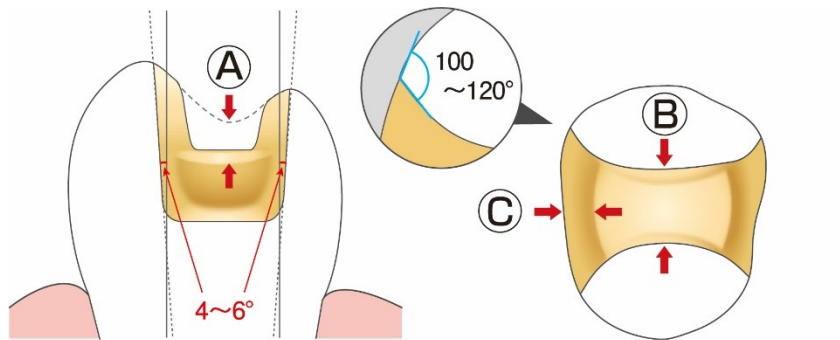


Fig. 2 Cavity margin setting

- 3) Ensure the isthmus to have a width of at least 1.5 mm (Fig. 3).
- 4) Prepare the cavity wall with greater angle than that of metal inlays (Fig. 3).
- 5) In the pit and fissure, prepare the cavity to have a depth of at least 1.0 mm in premolars and 1.5 mm in molars (Fig. 3).



	premolar	molar
Ⓐ pit and fissure	$\geq 1.0 \text{ mm}$	$\geq 1.5 \text{ mm}$
Ⓑ isthmus	$\geq 1.5 \text{ mm}$	$\geq 1.5 \text{ mm}$
Ⓒ gingival wall	$\geq 1.0 \text{ mm}$	$\geq 1.0 \text{ mm}$

Fig. 3 Cavity preparation

- 6) Ensure the cavity margin has a butt joint without any bevel (Fig. 4).

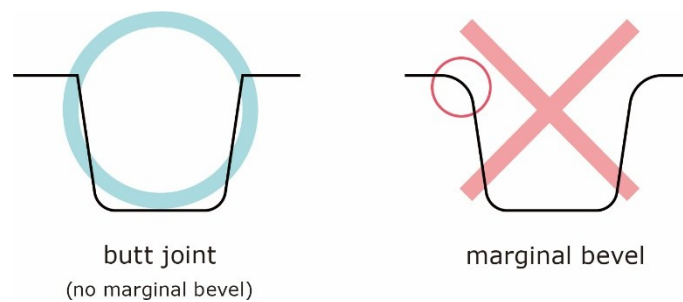


Fig. 4 Cavity margin

7) Avoid rough margins.

8) Prepare the gingival margin as a rounded shoulder or deep chamfer (Fig. 5).

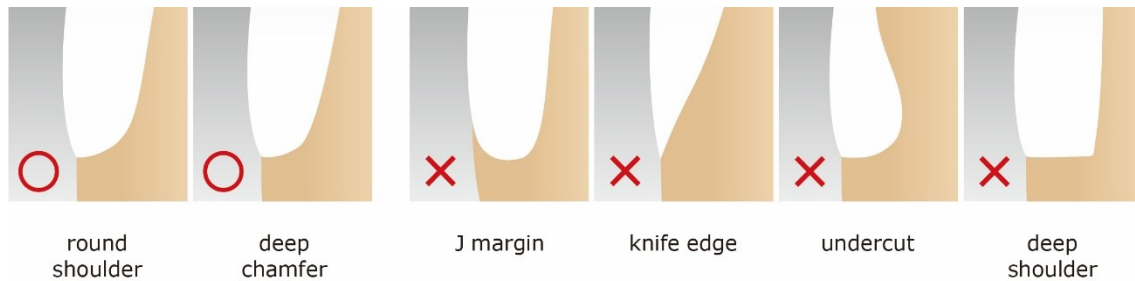


Fig. 5 Cavity margin

5. Impression Taking and Occlusal Registration

1) Conventional impression methods

- Perform gingival retraction according to standard procedures to clearly expose the finish line.
- Take the impression using agar–alginate or silicone rubber impression materials.
- Perform occlusal registration as clinically indicated.

2) Optical impression method (using an intraoral scanner [IOS])

- Perform scanning according to the manufacturer's instructions of each IOS.
- Care should be taken, as line angles may interfere with proper reflection of the IOS light, preventing accurate data capture (Fig. 6).

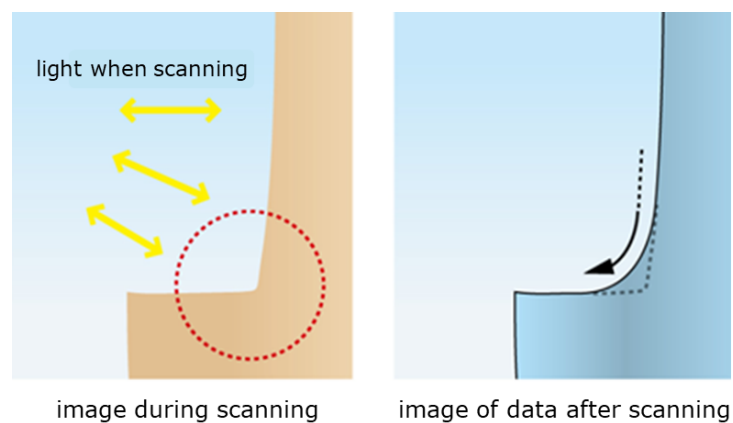


Fig. 6 Intraoral scanning at line angle

6. Placement of CAD/CAM Inlays

- 1) Adhesive resin cement must always be used for placement.
- 2) Alumina sandblasting: After intraoral trial fitting, sandblast the internal surface of the inlay immediately before placement using low pressure (0.1 – 0.2 MPa).
- 3) Silane coupling treatment: Apply a primer containing a silane coupling agent to the internal surface of the inlay. Combining sandblasting with silane treatment significantly enhances the bond strength between the inlay and the tooth surface.
- 4) After preparing the tooth surface according to the manufacturer's instructions, perform bonding using dental adhesive resin cement.
- 5) Occlusal adjustment should be carried out after inlay placement to prevent fracture due to occlusal forces.
- 6) After removing excess cement, it is recommended to protect the cement line at the butt-joint from the poor polymerization that occurs with Oxygen-exposure.

7. Control and Management of CAD/CAM Inlays

- *Traceability* refers to the ability to track the distribution pathway of materials from production to consumption. It is desirable to maintain traceability for all dental laboratory procedures, including those involving CAD/CAM inlays.
- When materials for CAD/CAM inlays are provided with a traceability label indicating the lot number, medical institutions and dental laboratories are encouraged to retain and manage the label (e.g., by affixing it to the patient's clinical record).

8. Conclusion

The wave of digital transformation (DX) in healthcare is steadily extending into dentistry. In recent years, the concept of metal-free dental treatment has also begun to gain public acceptance. The Japanese Society of Conservative Dentistry will continue to play a significant role in supporting the mission, “keep 28 teeth throughout our lives”, by striving to ensure safe and reliable dental care for the public.

Note

This technical guideline was developed based on the information provided by YAMAKIN CO., LTD (Kounan, Kochi, Japan).