Die Preparation & CAD/CAM

1 Die Preparation

1. Ditching

- **Definition:** The process of trimming and removing **excess stone** around the margin of a prepared tooth on a **working cast** to clearly expose the **finish line**.
- **Purpose:**

1. **Clearly identify and improve visibility of the margins** 👀
2. **Allow accurate wax pattern fabrication** 🖌️
3. **Prevent over-contoured or under-extended margins** ⚖️

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Think of ditching like **tidying up your desk** before starting a project – everything needs to be neat and visible! 😄

2. Margin Identification

- Accurately identifying the **margins of the prepared tooth** is essential for:

- Proper restoration fit
- Correct contours and contacts
- Avoiding under- or over-extended margins

3. Die Spacer

- **Application:** Painted on the prepared tooth **except the finish line and 1 mm above it**.
- **Total Thickness:** 20–40 microns (depending on the type of cement used)
- **Purpose:**

1. **Provide space for cement** 🪄
2. **Improve seating of the restoration** 🪑

- **Common Errors in Die Spacer:**

- Applying **too many layers** → loose crown ❌
- Applying **too close to margin** → open margin ❌
- **Uneven application** → incomplete seating ❌

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Remember: Die spacer is like a **comfy pillow for your crown** – too little or too much and it won't sit right! 😴

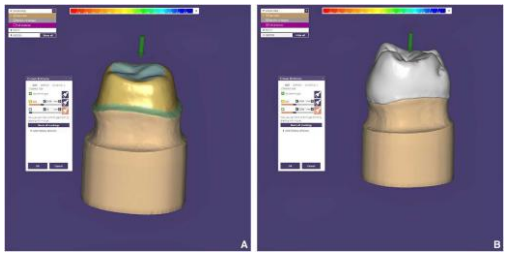
2 Virtual Working Cast & Dies

Virtual Working Cast

- **Definition:** A 3D digital model representing **prepared teeth, adjacent teeth, and gingival tissues**.
- Created using **scanning technology** instead of traditional gypsum.

Virtual Die

- **Definition:** A digital reproduction of an **individual prepared tooth**, separated from the virtual cast.
- **Uses:**
  - Margin identification
  - Restoration design
  - Evaluation of contours and contacts



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Basically, it's like having a **digital twin of your tooth**!

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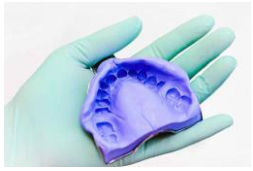
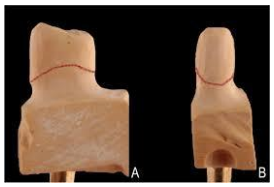
3 Traditional vs Digital Workflow

Traditional Workflow

- Conventional impressions
- Stone working casts
- Sectioned dies





Digital Workflow (CAD/CAM)

With the development of CAD/CAM technology, all the above procedures can now be **performed digitally**, giving rise to **virtual working casts and dies**.

4 CAD/CAM Technology 🎛️

💻 What it Means

- **CAD:** Computer Aided Design → design dental restorations digitally
- **CAM:** Computer Aided Manufacturing → manufacture them automatically using **milling** or **3D printing**

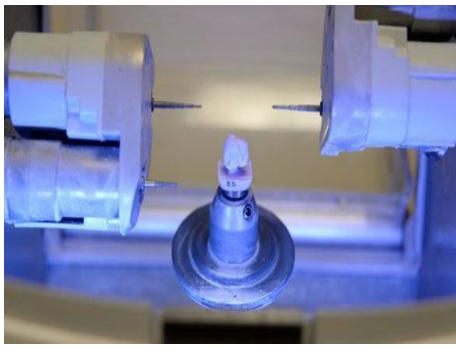
🔹 Uses:

1. Design dental restorations on a computer 🖥️
2. Manufacture them automatically using milling units or 3D printers 🏭

🛠️ Main Components of a CAD/CAM System

Every CAD/CAM system consists of **three main parts**:

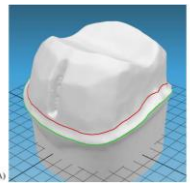
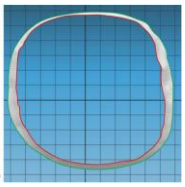
1. **Input Unit (Scanner):**
   - Used to take **digital impressions** for teeth and soft tissues
   - **Types:**
     - **Intraoral scanners:** Scan teeth & soft tissues directly in the mouth 🏠
     - **Extraoral scanners:** Scan casts or impressions outside the mouth 🏢
2. **Software (CAD):** Designs the restoration digitally 🎨

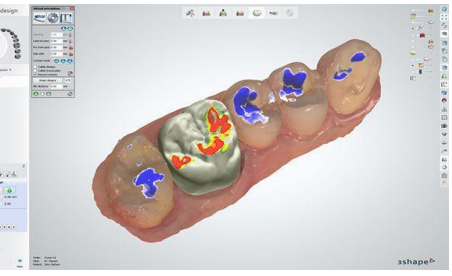


3. **Output Unit (CAM):** Fabricates the restoration automatically 🔧

⚙️ Steps of CAD/CAM

1. **Step 1 – Data Acquisition:**
   - Digital impression obtained via **intraoral scanning** or **extraoral scanning**
2. **Step 2 – Design Phase (CAD):**
   - Die trimming and marking the **preparation margin** 🖍️
   - Design the restoration 💻
   - Adjust occlusion and contacts ⚖️
3. **Step 3 – Manufacturing Phase (CAM):**
   - The design file is sent to a **milling unit** or **3D printer** 🖨️
4. **Step 4 – Finishing:**
   - Polishing ✨
   - Staining & glazing 🎨
   - Cementation in the patient's mouth 🦷




💻 Virtual Die Ditching

🔹 **Definition:** Digital process of removing **excess virtual material** around the finish line to clearly expose it.

🔹 **Purpose:**

1. Accurate margin visualization 👀
2. Proper restoration fit ☑️

🔹 **Advantages of Digital Ditching:**

- No risk of damaging margins 🙌
- Reversible & editable 🔄
- Highly precise 🎯

🌟 Advantages of Virtual Cast & Dies

1. **Accuracy:** No distortion from impression materials or dimensional change of stone 📏
2. **Storage:** Digital files → saves physical space 💾
3. **Communication:** Easy sharing between clinic & lab 📩
4. **Durability:** No chipping, wear, or breakage 💪

⚠️ Limitations

1. High initial cost 💰
2. Need for training 🎓
3. Learning curve 📈
4. Dependence on scanning quality 🎯

🔍 Features Comparison

Feature	Conventional Cast	Virtual Cast
Material	Gypsum or resin	Digital file
Distortion	Possible	Minimal
Storage	Physical	Digital
Shipping	Required	Not required
Editing	Impossible	Easy
Longevity	Can be scratched or fractured	Permanent

Pro Tip: Virtual casts are like your **tooth's digital superhero twin** 🦸🦷 – indestructible, editable, and always ready for action! 😎