

VR Assembly

Learn how to build interactive 3D disassembly and reassembly experiences in SimLab Composer without writing code. This three-part video series covers core assembly node graphs, tool animations, sub-assemblies, custom component logic with the Training Builder, and flexible dependency modes (ALL vs. ANY).

- VR Assembly Basics
- Sub-Assemblies and custom components
- VR Assembly Dependency Modes (ALL vs. ANY)

VR Assembly Basics

The **VR Assembly System** in SimLab Composer provides an intuitive, code-free framework to design step-by-step 3D disassembly and reassembly procedures for Virtual Reality and interactive 3D desktop environments. By using a visual node graph, you can map out exact mechanical assembly sequences, enforce part dependencies, and build realistic interactive training scenarios where certain bolts, covers, and retainers must be removed in a strict, realistic order.

Core Features & Capabilities

- **Node-Based Sequence Control:** Define precise procedural order using a simple left-to-right flow diagram.
- **Component Types & Interchangeable Parts:** Define identical items (such as short/long bolts or standard washers) into groups so users can place them back into any matching hole during reassembly.
- **Tool Assignment & Animations:** Require specific tools (such as wrenches, hex keys, or torque drivers) to loosen or tighten components, complete with keyframed action animations and ratchet sound effects.
- **Ghosting & Placement Feedback:** Set visual ghost transparency indicators and audio cues for valid or invalid part placements.
- **Training Builder Integration:** Trigger custom 2D text notifications, audio instructions, or UI popups upon component disassembly.

Video Tutorial

Watch the SimLab VR assembly basics tutorial:

<https://www.youtube.com/embed/5dwvKgaDiyU>

Sub-Assemblies and custom components

Complex mechanical equipment often requires more than simple individual part removal. SimLab Composer allows you to group components into sub-assemblies and create custom components controlled through the Training Builder to handle specialized tools like bearing pullers, press fits, or custom machinery interactions.

Core Features & Capabilities

- **Sub-Assembly Management:** Group multiple internal or connected parts into a single unit (e.g., a complete gear shaft assembly). Users can detach the entire sub-assembly first, then take it apart piece by piece on a workbench.
- **Custom Component Status:** Assign special status to components that require complex removal procedures beyond standard hand-grabbing or basic tool loosening.
- **Training Builder Integration:** Link custom components to interactive visual sequences, custom event triggers (`Node Disassembled`, `Node Snapped`), and boolean conditions.
- **Snap & Socket Positioning:** Utilize socket attachment points to ensure specialized tools (like a jaw puller) align perfectly with components before triggering removal logic.
- **Scene State Restoration:** Use scene states to capture exact part transforms, ensuring custom components return smoothly to their correct assembled locations.

Video Tutorial

Watch the SimLab VR sub-assemblies and custom components tutorial:

https://www.youtube.com/embed/bvja_KeNJmo?t

VR Assembly Dependency Modes (ALL vs. ANY)

When building mechanical assembly diagrams in SimLab Composer, different components require different rules for when they can be detached. Dependency Modes dictate whether a part requires **all** preceding connected components to be removed first or if removing **any single** preceding component unlocks it.

Core Features & Capabilities

- **ALL Dependency Mode (Default):** Requires every connected precursor node to be removed before unlocking the next part in the sequence (e.g., all 4 bolts holding a cover plate must be detached before the cover can be moved).
- **ANY Dependency Mode:** Unlocks a component as soon as *any one* of its connected precursor parts is removed (e.g., a bearing mounted on a shaft that can be accessed from either side once either the retaining ring *or* the spacer is removed).
- **Visual Node Identification:** Easily distinguish dependency modes directly inside the assembly diagram—nodes set to **ANY** feature a distinct gray color tag for quick visual tracking.
- **Flexible Procedural Paths:** Create non-linear disassembly scenarios that accurately reflect real-world mechanical options where maintenance technicians have multiple valid disassembly sequences.

Video Tutorial

Watch the SimLab VR assembly dependency mode tutorial:

<https://www.youtube.com/embed/VaYa0hp86qM>