

Mesh Tools — User Manual

Subdivision • Dynamic Subdivide • Crease Tool • Mesh Reduction

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Introduction

Mesh Tools is a modeling suite for SketchUp designed to bring high-end mesh editing workflows into a simple, intuitive environment.

The plugin includes four main tools:

1. **Loop Subdivision** — Smooths and refines geometry permanently using the Loop algorithm.
2. **Dynamic Subdivide** — A real-time, non-destructive subdivision preview system.
3. **Crease Tool & Overlay** — Freezes edges so they stay sharp during subdivision, showing active creases in red.
4. **Mesh Reduction (QEM)** — A fast, high-quality mesh simplifier to lower triangle counts.

Together, these tools create a complete high-poly ↔ low-poly workflow inside SketchUp, suitable for:

- Organic modeling & character sculpting
- Hard-surface smoothing
- Game asset optimization
- Cleanup of imported meshes
- Architectural detailing

1. Loop Subdivision

1.1 Overview

Loop Subdivision smooths and refines selected geometry using the Loop subdivision algorithm (*Charles Loop, 1987*). It converts low-poly meshes into smooth, organic surfaces while preserving:

- UVs & Materials
- Boundary edges
- Selection borders (if part of a larger mesh)
- Frozen creases set by the Crease Tool

1.2 How to Use It

1. Select the geometry you want to subdivide.

2. Go to **Plugins** → **Mesh Tools** → **Subdivision** or click the **Subdivision** icon on the Mesh Tools Toolbar.



3. Choose your settings:
 - **Iterations** — How many times it subdivides (1–4). Higher numbers make the result smoother.
 - **Soften edges** — Makes shading smooth across new faces.
 - **Put result on its own tag** — Assigns output to Loop_subdiv.
 - **Group result** — Wraps the result in a group.
4. Click **OK**.

SketchUp replaces your selection with a smoothed version.

1.3 Best Practices

- Use 1–2 iterations for most models.
- Use on clean, simple geometry for best results.
- Keep a backup copy of your original geometry before running static subdivision if you want to revert later.

2. Dynamic Subdivide

2.1 Overview

Dynamic Subdivide is a real-time subdivision preview system. Instead of producing a permanent static result, it creates a live subdivided mesh that updates instantly as you edit the original low-poly geometry (the "cage").

Ideal for:

- Organic modeling
- Character sculpting
- Iterative shape exploration
- Non-destructive workflows

2.2 How to Use It

1. Select **one** group or component.
2. Go to **Plugins** → **Mesh Tools** → **Dynamic Subdivide** or click the **Dynamic Subdivide** icon on the Mesh Tools Toolbar.



3. A dialog appears with settings.
4. Edit the original group — the smooth preview updates automatically in real time.
5. When done:
 - Click **Apply** to keep the smooth version.
 - Click **Cancel** to discard the preview and go back to your original model.

2.3 What You'll See

- Your original group becomes semi-transparent blue (the "cage").
- A new smooth version appears over it.
- Changing settings updates the preview instantly
- (Warning- a hidden object is created, to recreate the materials on the final result, don't delete it, it automatically gets deleted when you click Apply or Cancel/)

2.4 Settings

- Iterations — how many times it subdivides, make the preview smoother.
- Soften edges — smooth shading
- Put result on its own tag — (Loop_subdiv)
- Group result — Wraps result in a group

2.5 Tips

- Keep the cage simple — fewer faces = faster updates.
- Use 1–2 iterations for real-time modeling.
- Apply when you're satisfied with the shape, or Cancel to return to your original model.

3. Crease Tool & Crease Overlay

3.1 Overview

The **Crease Tool** lets you mark edges or face borders to keep them sharp while the rest of the model gets smoothed by Subdivision or Dynamic Subdivide.

3.2 How to Use It

1. Select the **Crease Tool** from the Mesh Tools Toolbar or **Plugins** → **Mesh Tools** → **Crease Tool**.



2. Click on any edge or face to toggle a crease on or off.
 - *Preselection:* You can also select edges/faces first, then activate the tool to crease them all at once.
3. Active crease lines will display in bright **red** in the viewport via an overlay.
4. To remove all creases at once, go to **Plugins** → **Mesh Tools** → **Clear All Creases**.

4. Mesh Reduction (QEM Simplifier)

4.1 Overview

Mesh Reduction lowers the number of triangles in your model while keeping the overall shape, using Quadric Error Metrics (QEM) — the industry standard for mesh decimation.

Ideal for:

- Cleaning up imported high-poly meshes
- Reducing file size and improving SketchUp performance
- Preparing models for games or real-time rendering

You choose how much to reduce — either by percentage or by exact triangle count.

4.2 How to Use It

1. Select the geometry, group, or component you want to simplify. *(If nothing is selected, it can process the whole model).*
2. Go to **Plugins** → **Mesh Tools** → **Mesh Reduction** or click the **Mesh Reduction** icon on the toolbar.



3. Choose your settings:
 - **Target triangle count** — Enter an exact target number.
 - **OR percentage** — Choose a target percentage (5%, 10%, 25%, 50%, 70%).
 - **Preserve boundary edges** — Keeps outer open edges sharp (useful when reducing part of a larger object).
 - **Soften edges** — Applies smooth shading to the result.

- **Put result on its own tag** — Places the result on the MeshReduce tag.
- **Group result** — Wraps output in a new group.

4. Click **OK**.

Your selection is replaced with a simplified version.

4.3 Tips

- Use **Preserve boundary edges** for architectural or hard-surface models to prevent gaps.
- Turn off boundary preservation for closed organic shapes.
- Use percentage mode for quick reductions.
- Use exact triangle counts for specific game asset targets.
- **Reducing too much can distort the model — start with 50%**

5. Conclusion

Mesh Tools brings a complete, professional mesh editing workflow into SketchUp with:

- High-quality static subdivision
- Non-destructive real-time smoothing
- Feature-preserving edge creasing
- Industry-standard mesh reduction

These four tools work seamlessly together to give you full control over high-poly and low-poly workflows inside SketchUp.