Mesh Tools — User Manual

Subdivision • Dynamic Subdivide • Mesh Reduction

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Introduction

Mesh Tools is a professional-grade modeling suite for SketchUp, designed to bring high-end mesh editing workflows into a simple, intuitive environment. The plugin includes three core tools:

1. **Loop Subdivision** — smooths and refines geometry using the Loop algorithm
2. **Dynamic Subdivide** — a real-time, non-destructive subdivision preview system
3. **Mesh Reduction (QEM)** — a fast, high-quality mesh simplifier

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 it is part of a bigger mesh)

1.2 How to Use It

Go to **Plugins → Mesh Tools → Subdivision** or click the **Mesh Tools Toolbar → Subdivision Icon**

1. Choose your settings:
    - **Iterations** — how many times it subdivides, make the result smoother.
    - **Soften edges** — makes shading smooth
    - **Put result on its own tag** — (`Loop_subdiv`)
    - **Group result** — Wraps result in a group
2. 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 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 static result, it creates a live subdivided mesh that updates instantly as you edit the original 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 **Mesh Tools Toolbar → Dynamic Subdivide Icon**

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

What you'll see

- Your original group becomes **semi-transparent blue** (the "cage")
- A new smooth version appears next to 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**/)

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

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
- Cancel if you want to return to your original model

3. Mesh Reduction (QEM Simplifier)

What it does

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. It's ideal for:

- Cleaning up imported meshes
- Reducing file size
- Making SketchUp run faster
- Preparing models for games or real-time rendering

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

How to use it

1. Select the geometry, group, or component you want to simplify
2. Go to **Plugins → Mesh Tools → Mesh Reduction** or click **Mesh Tools Toolbar → Mesh Reduction Icon**

3. Choose your settings:
    - **Target triangle count** — exact number
    - **OR percentage** — 5%, 10%, 25%, 50%, 70%
    - **Preserve boundary edges** — keeps outer edges sharp (useful if only reducing part of a bigger object)

- **Soften edges** — smooth shading
- **Put result on its own tag** — Places result on `MeshReduce`
- **Group result** — Groups output

4. Click **OK**

Your selection is replaced with a simplified version.

Tips

- Use **Preserve boundaries** for architectural or hard-surface models
- Turn it off for organic shapes
- Use percentage mode for quick reductions
- Use exact triangle count for game assets
- **Reducing too much can distort the model — start with 50%**

5. Conclusion

Mesh Tools brings powerful, professional mesh editing workflows into SketchUp with:

- High-quality subdivision
- Real-time smoothing
- Industry-standard mesh reduction

The three tools complement each other, forming a complete modeling ecosystem suitable for artists, designers, architects, and technical users alike.