

TrueShape

Cut the triangle count of any model without changing its shape, then bake the fine detail back as a normal map.



Left: 21,510 triangles. Right: 10,000 triangles after one Reduce. No vertex moved; the frame, spokes and chain keep their exact shape.

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1. What TrueShape does

TrueShape has two tools, found in the 3D Viewport sidebar (press **N**) under the **TrueShape** tab.

Reduce

Removes triangles until your selection fits a triangle budget. It never moves or invents a vertex: the result is built only from vertices the model already had. That is why thin parts such as tubes, spokes and straps cannot shrink, and why UVs stay exact.

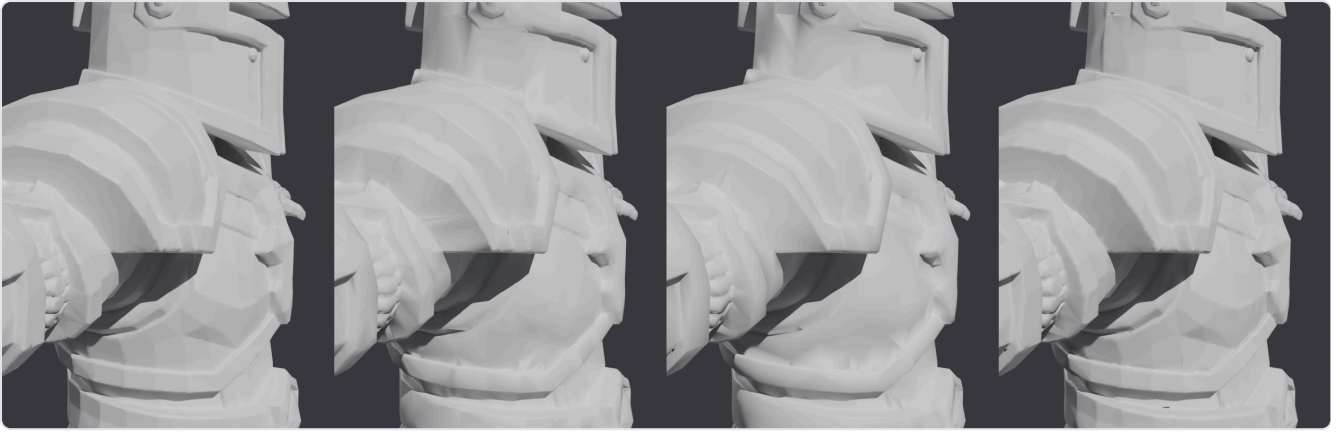
It removes the cheapest things first, across every selected object at once, so the budget goes where the model needs it:

- **Whole edge loops** that carry no shape (for example, the extra rings along a straight tube). This keeps clean quad flow.
- **Single vertices** where there are no clean loops, merged into a neighbour.

Every removal is measured against the original: how far it moves the surface, and how far it turns it. Reduce never makes a change that goes past the limits you set, and it tells you if the budget could not be reached within them.

Bake Detail

Detail smaller than the new triangles cannot survive any reduction. Bake Detail puts it back into the lighting: it bakes a normal map from the original onto the reduced model, the standard way game assets look dense while staying light.



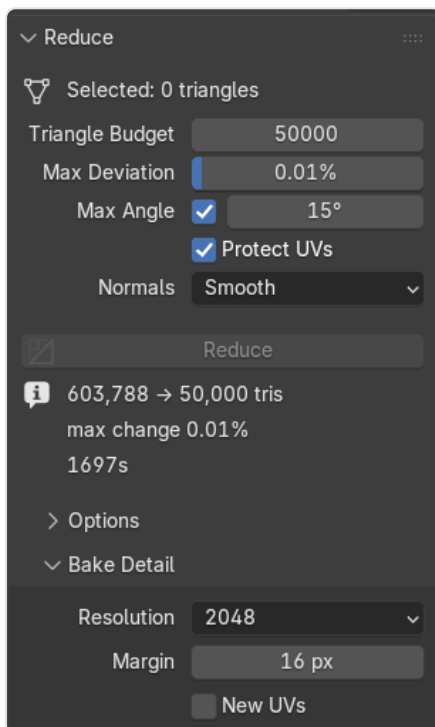
From left: original (604k triangles) · Reduce with Keep Surface Detail (130k) · Reduce to 50k · 50k + Bake Detail. The baked version looks close to the original at a twelfth of the triangles.

2. Installing

1. In Blender, open **Edit > Preferences > Get Extensions** .
2. Click the  menu at the top right and choose **Install from Disk...**
3. Pick **trueshape-0.5.0.zip** . The add-on is enabled straight away.

You can also drag the zip file onto the Blender window.

3. Quick start



1. In Object Mode, select the object(s) you want lighter. The panel shows how many triangles are selected.
2. Set **Triangle Budget** to your target, for example 10,000.
3. Leave the other settings at their defaults for a first try.
4. Click **Reduce** . A progress bar replaces the button. You can orbit the view while it works; press **Esc** to cancel.
5. A new object called **<name>_low** appears next to each original. The originals are hidden, never changed.
6. If fine surface detail looks softer, keep the new object selected and click **Bake Detail** .

Safe to experiment

Reduce never edits your original. Press **Ctrl Z** to undo, or delete the **_low** objects and unhide the originals with **Alt H** .

4. Tutorial 1: a game-ready prop

Goal: a 21,510-triangle BMX bike (nine separate parts: frame, fork, wheels, chain, brake and so on) under 10,000 triangles, looking the same, with every part still separate so the wheels can spin.

1. **Select all nine parts.** Reduce shares one budget across everything selected, and spends it where it matters: the chain and spokes keep their triangles while flat plates and straight tubes give theirs up.
2. **Set Triangle Budget to 10000.**
3. **Set Max Deviation to 1%** (the default). The bike is about 5 units across, so no point of the surface may move more than about 5 cm.
4. **Untick Max Angle (Keep Surface Detail).** This bike is stylised and flat-shaded, so its facets are meant to show; protecting every small facet would stop Reduce at about 12,600 triangles.
5. **Leave Protect UVs on**, because the bike is textured.
6. **Click Reduce.** About 10 to 20 seconds later there are nine `_Low` objects with 10,000 triangles between them.



21,510 triangles (left) and 10,000 (right). The largest measured distance between the two surfaces was 0.02% of the bike's size.

Why each part stays usable

Every `_Low` object keeps its original's location, rotation (including quaternion rotation), scale, parent, collections, materials, vertex group weights, modifiers, constraints and animation. A wheel that spun before still spins.

Split imports are handled for you

This bike came in as loose triangles, with every face separate from its neighbours. Reduce welds such models automatically and keeps them flat-shaded, so they look exactly as they did.

5. Tutorial 2: a dense character with baked detail

Goal: a 604,000-triangle AI-generated knight (no UVs, crisp armour bevels and hammered plates) down to 50,000 triangles for a game, keeping its look.

Step 1: decide how much detail geometry can keep

Run Reduce once with **Keep Surface Detail** on at 15°. On this knight it stopped at about 130,000 triangles with the report "budget not reached". That is useful information: keeping every bevel as real geometry needs about 130k triangles. At 50k, the finest detail has to live in a normal map instead.

Step 2: reduce to the budget

1. Select the original knight.
2. Triangle Budget **50000**, Max Deviation **1%**.
3. **Untick Max Angle** (or raise it to about 30°). The bake will restore the lighting detail, so geometry only has to hold the silhouette.
4. Normals: **Smooth**. The bake is computed against these normals.
5. Click **Reduce**. A 604k mesh takes several minutes; the progress bar shows how far it has got.

Step 3: bake the detail back

1. Keep `medieval_knight_paladin_low` selected and active. TrueShape knows which original it came from.
2. Resolution **2048**, Margin **16 px**.
3. Click **Bake Detail**. The knight has no UVs, so TrueShape unwraps it first, then Blender bakes in the background (progress in the status bar, Esc cancels). On the test machine the 2048 bake took about 4 seconds.

The result is the right-hand render on page 2: 50,000 triangles that light almost exactly like the 604,000-triangle original.

Bake onto a fresh Reduce

Only bake onto objects made by TrueShape 0.3 or later. Older versions copied the original's custom normals without converting them, and a normal map baked against those normals comes out wrong.

6. Reduce: every setting

Setting	What it does	Use it / raise it when	Avoid / lower it when
Triangle Budget default 10,000	Total triangles for everything selected together. N-gons count as the triangles they would split into.	Set it to the real target: a game's per-asset budget, or a level-of-detail step (LOD1 about 50%, LOD2 about 25%).	Don't expect any budget to be met at any cost. If a limit below stops Reduce first, the report says so; loosen that limit or bake instead.
Max Deviation default 1%, minimum 0.01%	The furthest any part of the surface may move, as a share of the selection's size (its bounding-box diagonal).	0.5–2% for game assets seen at normal distance. Raise it if Reduce stops early and the result still looks right.	0.1–0.3% for close-ups or hero assets. At the minimum, 0.01%, almost nothing may move, so Reduce often stops long before the budget.
Max Angle Keep Surface Detail, on, 15°	The furthest any part of the surface may turn. Lighting follows surface direction, so this protects bevels, creases and small facets that barely move the surface but change how it looks.	Keep it on for untextured or unbaked assets, and anything with crisp hard-surface detail. Lower it (10°) to keep more detail.	Turn it off, or raise it to 25–35°, for stylised low-poly models whose facets are meant to show, and whenever you will use Bake Detail afterwards.
Protect UVs on	Keeps UV seams exactly, and skips any removal that would slide the texture by more than UV Tolerance.	Any textured model you will keep using with its current textures.	Untextured models, or ones you will re-unwrap and re-bake anyway. Turning it off lets Reduce go further.
Normals Smooth	Smooth recomputes normals from the reduced shape; marked sharp edges stay sharp. From Original gives each kept vertex the exact normal it had on the original.	Smooth: almost always, and always before Bake Detail. From Original: smooth organic models whose authored lighting you want to match without baking.	From Original on flat-shaded or faceted models; the original's per-face look can't be carried by fewer faces. Never keep the original's custom normals as they are: they only make sense on the original geometry.

7. Reduce Options: every setting

Under **Reduce > Options**. The defaults suit most models.

Setting	What it does	Raise it when	Lower it when
UV Tolerance 0.002	How far, in UV units, the texture may slide under a removal (0.002 is about 4 pixels on a 2048 texture).	Textures are low-resolution or blurry, and you want more reduction.	The texture has pixel art, text or decals that must not shift.
Pair Triangles 10°	Before reducing, joins triangle pairs that are nearly flat into quads, so Reduce can find edge loops to remove.	The model was triangulated on export and you want cleaner quad flow in the result.	0° keeps triangles as they are; Reduce then works vertex by vertex.
Weld 0.00001	Merges vertices closer than this share of each object's size. Fixes models imported with every face split apart (OBJ, STL, game rips).	The model has tiny gaps between faces that should touch.	Separate parts sit very close together and must stay separate (layered clothing, stacked plates). 0 never merges.
Keep Modifiers on	Gives each reduced copy its original's modifiers, unapplied: Armature, Mirror, Subdivision and the rest. Hooks follow their vertices.	Turn it off when you want only the bare reduced mesh. Section 11 lists the few modifiers that can't follow.	
Keep Shape Keys on	Carries every shape key over with its value, range and drivers. Each kept vertex sits exactly where it did in every key.	Turn it off for static props and distant LODs that don't need them: every key adds to the file and to export size.	
Hide Original on	Hides the source objects after Reduce. They are never modified either way.	Turn it off to see before and after side by side.	

8. Bake Detail: every setting

Setting	What it does	Advice
Resolution 2048	Size of the normal map: 1024, 2048 or 4096 pixels square.	1024 for small props, 2048 for most assets, 4096 for large or hero characters. Higher resolution bakes slower and uses more memory in-game.
Margin 16 px	How far the bake bleeds past the edge of each UV island.	Raise it (24–32) if thin dark lines or specks appear along UV seams, especially when the texture is mip-mapped in a game.

New UVs
off

Unwraps a fresh UV map called `TrueShape_Bake` for the bake, even if the model already has UVs. Models without UVs are always unwrapped.

Turn it on when the existing UVs overlap or are mirrored: a bake needs every face to have its own space. Your original UV map is kept for the other textures.

What Bake Detail creates

An image

`<object>_normal` , packed into the .blend file. To export it, open it in the Image Editor and use **Image > Save As** .

Material copies

`<material>_<object>` , with an Image Texture (Non-Color) → Normal Map → Principled BSDF Normal. The original's materials are not touched.

A UV map

`TrueShape_Bake` , only if one had to be unwrapped.

Render engine

Baking needs Cycles. TrueShape switches to it for the bake and switches back afterwards. Cycles uses your GPU if it is set up under **Preferences > System** .

Exporting to game engines

Blender bakes OpenGL-style normal maps (green channel up). Unity and Godot use the same convention. Unreal uses DirectX style: tick *Flip Green Channel* on the texture in Unreal.

9. Reading the result

After each run the panel shows one fact per line:

21,510 → 10,000 tris	Triangles before and after, across all selected objects.
moved ≤ 0.16%	The largest distance any removal moved the surface, as a share of the selection's size. A cautious upper bound: the true figure is usually lower.
turned ≤ 15°	The largest angle any part of the surface turned.
11s	How long it took.
counted before modifiers	Shown when the copies kept modifiers. The triangle counts are for the mesh itself; a Mirror or Subdivision modifier adds its own on top.
budget not reached	Shown when a limit stopped Reduce first. The Info log says which one: Max Deviation or Max Angle, or "nothing else can go without breaking UVs, seams or topology".

While it runs, the button becomes a progress bar (Preparing, Finding removals, Reducing $n \rightarrow \text{budget}$ tris), and the status bar shows the same. You can orbit and zoom; other editing waits until it finishes. **Esc** cancels and changes nothing. The same model with the same settings always gives exactly the same result.

10. Recipes

Bought or AI-generated asset for a game, textured

Budget: your target · Max Deviation 1% · Max Angle 15–25° · Protect UVs on · Normals Smooth. If fine detail softens, run Bake Detail.

Dense sculpt, scan or AI mesh without UVs

Budget: your target · Max Deviation 1% · Max Angle off (or 30°) · Normals Smooth → Bake Detail at 2048 (4096 for hero characters).

Stylised low-poly or flat-shaded model

Max Deviation 1–2% · Max Angle off · Protect UVs on if textured.

Hero asset or close-up

Max Deviation 0.2% · Max Angle 10°. Accept a higher triangle count; the report tells you what the limits allow.

Level-of-detail chain

Reduce the original once per level (for example 50%, 25% and 10% of the original count), each from the original, not from the previous level. Raise Max Deviation for the far levels (2–5%).

Multi-part model sharing one budget

Select every part and run once. Parts stay separate objects with their pivots, parents and animation.

11. What is kept, what is not

Kept on the reduced copy	Not kept, or needs a second look
✓ Shape (within Max Deviation and Max Angle) ✓ UV maps, exactly ✓ Materials and per-face assignment ✓ Color attributes ✓ Vertex group weights (rigging) ✓ Shape keys, with their values, ranges and drivers ✓ Modifiers, unapplied (Armature, Mirror, Subdivision and the rest) ✓ Marked seams and sharp edges ✓ Location, rotation, scale, parent, collections ✓ Constraints, drivers, animation and custom properties	✗ Multires and hair particles are left out. Their data belongs to the original's faces, which no longer exist. TrueShape tells you when it drops one. ✗ Bound deformers (Mesh Deform, Surface Deform, Laplacian Deform, Corrective Smooth) are kept but must be bound again, because the vertices changed. TrueShape lists them. ✗ Custom normals as they were: they are rebuilt (see Normals).

Modifiers are carried over, not applied

Reduce works on the mesh as it is before modifiers, and the budget counts those triangles. That is what lets a rigged character keep its Armature and a mirrored model stay mirrored. To reduce what a modifier produces instead, such as a subdivided surface, apply that modifier first.

Rigs and shape keys stay exact where it counts

Every vertex in the result is an original vertex with its original weights and shape key positions, so it moves exactly as it did. Reduce measures Max Deviation on the resting shape, though. If a shape key or pose bends an area that is flat at rest, check it at full strength, and lower Max Deviation if it looks too coarse.

12. When not to use TrueShape

- **You need clean, even quad topology** for animation deformation, subdivision or further sculpting. Reduce keeps the original vertices and gives a mix of quads and triangles; it does not retopologize. Use a retopology tool (Blender's QuadriFlow or Voxel Remesh, or manual retopology) instead.
- **The mesh is already at or below your budget.** There is nothing to gain.
- **You need a live, adjustable result.** Reduce makes a new object in one go; to try other settings, delete it and run again.

13. Troubleshooting

"budget not reached"

A limit stopped Reduce first; the Info log says which. Raise Max Deviation, raise or untick Max Angle, or untick Protect UVs if the model is untextured. Or accept the count: it is what keeps the shape within your limits.

The result looks softer or less detailed

Detail smaller than the new triangles can't survive as geometry. Tick Keep Surface Detail (lower Max Angle keeps more), or run Bake Detail.

Shading looks blotchy or faceted

Use Normals: Smooth. If the object was made by a TrueShape version before 0.3, reduce the original again.

Bake Detail is greyed out

It needs the reduced object active and its original present. If the original was renamed, select the original and the reduced object together, with the reduced one active (last clicked).

The baked map is flat, or has specks along seams

Specks: raise Margin or Resolution. Flat map: make sure the original is in the scene and not deleted; overlapping UVs also cause trouble, so tick New UVs.

The viewport shows more triangles than my budget

The copy kept a modifier that adds geometry, such as Mirror, Subdivision or Array. The budget counts the mesh before modifiers, and the report says "counted before modifiers". Remove the modifier from the copy, or untick Keep Modifiers under Options.

A modifier on the copy shows an error or does nothing

Mesh Deform, Surface Deform, Laplacian Deform and Corrective Smooth remember the mesh they were bound to. Press Unbind, then Bind, on the reduced copy, with the rig in its rest pose.

It takes a long time on huge meshes

Reduce runs in Python: roughly 500 to 800 removals a second on a desktop CPU. A 21k-triangle prop takes seconds; a 600k-triangle character takes several minutes. The progress bar shows how far it has got, and Esc always cancels cleanly.