

VesselPlanner

Analyze Existing Tutorial

KSP1 • VesselPlanner 0.7.75

Analyze Existing evaluates the stage that is already on your vessel and compares replacement engine configurations against its real mass and currently loaded resources. It is the right page for asking, “What happens if I change the engines on this stage?”

Core idea: Analyze Existing keeps the stage structure and resources you already built, substitutes each candidate engine configuration, and recalculates delta-v, TWR, thrust, burn time, and propellant compatibility in the environment you choose.

Quick Workflow

Step	Action	What it does
1	Select Analyze Existing	Uses the vessel currently open in the VAB or SPH.
2	Choose a stage	Type a stage number, use +/-, Pick Stage, or click a stock staging header.
3	Set simulation controls	Choose minimum TWR, maximum engine count, and permitted engine classes.
4	Set body and altitude	Defines atmospheric thrust/Isp and the body gravity used for TWR.
5	Filter candidates	Use include/exclude text and optional bulkhead matching.
6	Simulate	VesselPlanner tests compatible engine/count combinations against the existing stage.
7	Inspect a result	Click an engine name and review its detailed replacement-engine result.
8	Add the replacement	Use Add or Add Engine to select the engine part for editor placement.

1. What Analyze Existing Actually Simulates

Analyze Existing does not design a new tankage system. It starts from the selected stage as it exists in the editor and tests candidate engines against that stage.

- **Current propellant matters.** The simulator uses the resource amounts currently loaded in the stage, not merely tank capacity. Partially filled tanks therefore produce a different result from full tanks.
- **Candidate propellant mixtures matter.** An engine is rejected if the stage does not contain the resources needed by that engine in a usable ratio.
- **KSP stock stage masses are preferred.** When KSP DeltaVStageInfo data is available, VesselPlanner uses the stock stage/start/end mass boundaries and substitutes the candidate engine mass into those boundaries.
- **The current engine configuration is handled specially.** If the candidate exactly matches the installed part type and count, the stock masses are kept intact so the installed engine is not effectively counted twice.
- **Tank capacity is not resized.** This page answers a replacement-engine question; use Planning when you want VesselPlanner to size propellant and tank requirements for a new stage.

Tip: For comparison work, fill the stage to the fuel level you actually intend to fly before trusting the Analyze Existing delta-v result.

2. Open Analyze Existing and Select the Stage

Open VesselPlanner in the VAB or SPH and choose Analyze Existing from the main mode row.

Use the Stage controls directly below the mode row. Analyze Existing can inspect only stages that actually exist on the current vessel, so the stage number is capped at the vessel's current maximum stage.

- **Stage field** — type a non-negative stage number.
- **+ / -** — step through the vessel's activation stages.
- **Pick Stage** — click Pick Stage, then click a vessel part. VesselPlanner uses that part's staging-display stage. Esc or right-click cancels.
- **Stock staging list** — clicking a stage header in KSP's staging list also selects that stage.

The same top row also shows useful context such as Craft max, Craft wet mass, Stage fuel, and the detected stage top-node size when available.

Refresh: If you change staging, engine assignment, tank fill level, or other editor data, use Refresh. The current stage is rescanned and the simulation is run again.

3. Set the Simulation Controls

The upper-left Simulation environment pane controls which engine/count combinations are allowed before the detailed candidate filters are applied.

Control	Meaning
Minimum TWR	Rejects configurations whose initial TWR is below this value in the selected environment.
TWR gravity	Displays the selected body's surface gravity. VesselPlanner uses this gravity for TWR.
Max engines	Largest cluster size to test. Internally the value is constrained to 1–64.
Ignore monopropellant	Removes engines that use MonoPropellant.
Include solid fuel	Allows or removes solid-motor candidates.
Include air-breathing	Allows or removes engines that require atmospheric intake resources.
Include electric-propellant	Allows or removes electric-propulsion candidates.
Simulate all engines	Runs the replacement-engine simulation with the current controls and filters.

Most changes recalculate immediately. The Simulate all engines button is useful when you want an explicit rerun after editing several controls.

4. Choose the Body, Altitude, and Candidate Filters

The right-side Candidate engine filters pane begins with the environment controls shared by Analyze Existing and Planning.

- **Planet / body** — select the body whose gravity and atmosphere you want to simulate.
- **Altitude** — move from the surface to the top of that body's atmosphere. The displayed pressure updates with altitude.
- **Airless bodies** — the altitude control is effectively zero and atmospheric delta-v equals vacuum delta-v.

Changing body or altitude recalculates environment-dependent thrust, Isp, atmospheric delta-v, and TWR. Burn time is based on vacuum thrust/Isp and does not change with the selected body or altitude.

Below the environment controls are the text and attachment filters:

- **Filter** — comma-separated include terms. Terms are OR matches against the displayed engine name or internal KSP part name.
- **Exclude** — comma-separated exclusion terms. If any exclusion term matches, the engine is hidden.
- **Match stage bulkhead size** — when enabled and a usable engine top node is detected, candidates must match the selected stage's detected top-node size.

Persistence: Engine Filter and Exclude text can optionally be saved between KSP sessions in Settings → Filters.

5. Read the Existing Stage Pane

The lower-left Existing stage pane is a scrollable diagnostic view of the selected stage. Settings → Analyze Existing controls which lines and sections are visible.

Group	What it tells you
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Group	What it tells you
Craft / payload	Craft wet/dry mass and the payload carried above the selected stage.
Stage propellant	Current mass and full-capacity propellant mass found in the stage.
KSP stage masses	Stock stage wet/dry/fuel mass, current-engine mass, vehicle start/end mass, and stock current burn time when available.
Tank information	Total stage tank capacity and known tank volume where resource-volume data is available.
Current engines	Installed engine names with thumbnails, ASL/Vac thrust, and ASL/Vac Isp.
Stage Resources	Capacity lines for resources present in the selected stage.

Hover over an engine thumbnail to see the enlarged rotating part preview. The appearance of list icons and rotating previews is configurable under Settings → Appearance → Part images.

6. Read and Sort the Candidate Engine List

The candidate table contains every valid engine/count solution that survives the current resource, class, name, bulkhead, TWR, and maximum-engine filters. Click a column heading to sort. Click the engine name itself to select that solution and open its details.

Column	Use it for
Engine / #	Part name and number of engines in the tested cluster.
Mass t/eng	Dry mass of one engine part.
Stage Wet t / Start Mass t	How the replacement changes the stage and full vehicle mass at ignition.
Atm Δv / Vac Δv	Delta-v at the chosen body/altitude and in vacuum.
ASL kN/eng / Vac kN/eng	Per-engine thrust reference values.
TWR / Max TWR	Initial environment TWR and vacuum-thrust TWR using the selected body gravity.
Isp ASL/Vac	Sea-level and vacuum specific impulse.
Burn / Fuel	Estimated burn time and usable propellant mixture for that candidate.
Cost Eff.	Atmospheric delta-v at the selected body/altitude per Fund of engine cost.
Bulkhead	Engine attachment profile inferred from the top node / part profile.

The visible engine-table columns are configurable under Settings → Engine Columns.

7. Inspect the Selected Engine

After selecting a candidate, the Selected Engine pane appears below the candidate list. The header shows the chosen engine and tested quantity, and Add Engine selects that engine part for placement in the editor.

- Burnable propellant and resource volume for the candidate engine mixture

- Estimated tank dry mass / engine mass / stage wet mass / vehicle start and end mass
- Atmospheric and vacuum delta-v
- Per-engine and total ASL/Vac thrust
- ASL/Vac Isp
- Initial/final TWR and maximum vacuum-thrust TWR
- Estimated burn time
- Individual fuel/resource requirements, including auxiliary resources marked for the engine

Remember: Analyze Existing does not show tank suggestions because the tanks are assumed to be the tanks already on the stage. If you need VesselPlanner to choose tank sets, switch to Planning.

8. Add a Replacement Engine to the Editor

You can start editor placement from either the Add cell in a candidate row or Add Engine in the Selected Engine pane. VesselPlanner asks KSP to select that engine part for placement.

If the candidate row calls for more than one engine, the # column and Selected Engine header tell you the required quantity; place that number using normal KSP editor symmetry/placement tools.

Settings → Analyze Existing includes Close planner after Add selects an engine for placement. When enabled, VesselPlanner closes only after KSP successfully selects the part.

9. Resize the Analysis Layout

- **Main window width** — drag the right-edge grip. VesselPlanner remembers the selected width.
- **Candidate/Selected Engine split** — drag the horizontal grip above Selected Engine to trade height between the candidate list and engine details.
- **Existing stage pane** — scroll it independently when many diagnostics, engines, or resources are visible.

Use Settings → Appearance → Detail pane sizes to reset remembered pane sizing. The same Appearance tab controls KSP/Alternate skin, solid backgrounds, tooltips, and part-image rendering options.

10. Example: Compare a Launch-Stage Engine Replacement

1. Open the launch vehicle in the VAB, choose Analyze Existing, and select the launch stage with Pick Stage or the stock staging list.
2. Set the body to Kerbin, choose the launch altitude, and enter the minimum TWR you require at liftoff.
3. Set the engine-class toggles and enable Match stage bulkhead size if you want only engines that fit the current stack interface.
4. Run Simulate all engines, then sort by Stage Wet t, TWR, Burn, Cost Eff., or another column that matches your design goal.
5. Click promising engines and compare atmospheric delta-v, thrust, fuel compatibility, and start/end mass in Selected Engine.
6. Use Add Engine when you are ready to try the replacement, then place the quantity shown in the candidate row.

11. Troubleshooting and Interpretation Tips

Symptom	Check
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Symptom	Check
No candidate or expected engine is hidden	Lower Minimum TWR, raise Max engines, check engine-class/monopropellant toggles, relax Filter/Exclude or bulkhead matching, and verify the stage contains the required resources.
Delta-v seems low	Check the current tank fill level. Analyze Existing intentionally uses the resource amount currently loaded, not maximum capacity.
Atmospheric result changes unexpectedly	Verify body, altitude, and pressure. Thrust and Isp are environment dependent.
Wrong or incomplete stage data	Use Pick Stage or a stock stage header and Refresh after changing staging. If KSP mass rows are missing, let the editor settle and Refresh again.

Next tutorial: For sizing a stage that does not exist yet, continue with Manual/VesselPlanner-Planning-Tutorial.docx.