

## MAXXESHOP3D

# Intermediate

## Assessment & Planning Before the Print Starts

### What this resource explains

This intermediate resource explains assessment and planning as a structured pre-print process. It covers model purpose, geometry review, orientation trade-offs, layer-direction thinking, support strategy, print time realism and how to justify a slicing plan from the shape of the part itself.



How to assess a model as a printable object, plan around geometry and trade-offs, and justify print decisions using evidence

### Skill Pathway

Expert

Advanced

Intermediate

Developing

Beginner

## Intermediate Level • Assessment & Planning

How to assess a model as a printable object, plan around geometry and trade-offs, and justify print decisions using evidence instead of habit.

**This intermediate resource explains assessment and planning as a structured pre-print process. It covers model purpose, geometry review, orientation trade-offs, layer-direction thinking, support strategy, print time realism and how to justify a slicing plan from the shape of the part itself.**

## Resource overview

At intermediate level, students should begin assessing models in a more analytical way. The question is no longer just whether a part can be printed, but how well it can be printed in different orientations and what those choices will mean for strength, support, finish and time.

Planning is critical because every print is a set of trade-offs. A model can be placed for easier support removal, for better strength, for better surface finish, or for lower risk on the bed, but these goals do not always point to the same orientation. Intermediate users learn to compare those competing outcomes.

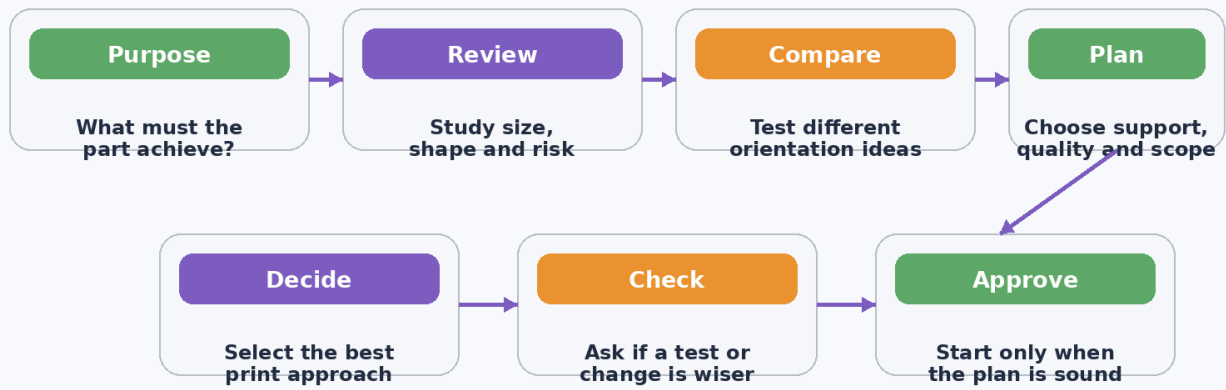
<b>Indicative level</b>	Intermediate
<b>Suggested use</b>	Students who already slice basic models and need stronger pre-print reasoning
<b>Best suited to</b>	Design-to-print classes comparing outcomes across different choices
<b>Learning focus</b>	Geometry analysis, trade-offs and evidence-based planning
<b>Related resource areas</b>	Student Activities • Bed Leveling & Calibration • What is 3D Printing

## Why print planning is really trade-off management

Intermediate users should recognise that most print planning decisions improve some outcomes while making other outcomes less ideal. A flat orientation might reduce support but weaken a loaded feature. A different orientation might strengthen the part but increase print time or make the visible surface less attractive. These are normal trade-offs, not mistakes.

Because of that, assessment should aim to identify which trade-offs matter most for the current job. A stronger planner can explain why one compromise is more acceptable than another.

## Diagram 1 • Assessment and planning sequence for better prints



**Key idea: assessment is really about comparing trade-offs such as support, strength, finish and stability.**

This diagram supports the intermediate explanation by showing the main assessment and planning stages that should happen before a print begins.

## Critical planning steps and why they matter

Activity area	What students do	Why it matters
<b>Analyse the geometry before slicing</b>	Look for tall thin sections, overhangs, bridging, small contact patches and likely weak points.	Geometry review helps predict where the print may struggle or fail.
<b>Think about layer direction and strength</b>	Consider how the chosen orientation lines up the layers in relation to expected forces.	Orientation influences part strength because printed layers do not behave identically in every direction.
<b>Choose a support strategy, not just support on/off</b>	Estimate where support matters most and which surfaces should be protected from support marks.	Support planning affects both success during printing and cleanup afterward.
<b>Balance finish, strength and efficiency</b>	Compare which outcome matters most for the job.	Different prints need different priorities, and planning should reflect that.
<b>Justify the final plan with evidence</b>	State why the selected orientation and slicing approach fit the model.	Evidence-based planning improves repeatability and makes troubleshooting clearer.

## Step 1: Read the geometry as a print problem before it becomes a print file

Intermediate planners should study the shape of the model before thinking about settings. Tall thin walls, narrow bases, suspended regions, internal voids and long bridges all create different kinds of printing demands. By identifying these features early, the student can predict where the printer may need more help or where the design may be naturally easier to produce.

This matters because the slicer will not always explain the consequences of geometry in simple language. It may generate support or toolpaths, but the user still needs to interpret whether those choices make sense for the real object. A model that looks attractive on screen may still be risky because of how it builds layer by layer in physical space.

This step is taken because strong planning begins with reading the object itself. Students who understand geometry make better print decisions before the software has a chance to hide the problem inside settings.

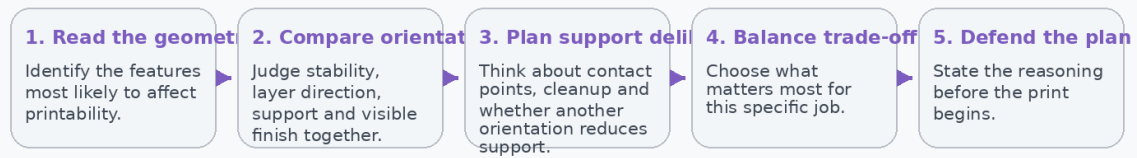
## Step 2: Compare orientation through multiple trade-offs

At intermediate level, orientation should be judged through several lenses at once: bed stability, support need, layer direction, visible surfaces and print time. Rotating a part changes more than its shape on the screen. It changes how forces travel through the printed layers, which surfaces face upward or downward, and which features need support.

No single orientation is automatically best for every goal. A user may deliberately choose an orientation that uses slightly more support because it protects a critical face or improves functional strength. Another job may accept lower strength because visual finish matters more. The key is that the choice should be intentional.

This step is taken because trade-off thinking is the heart of intermediate planning. Students become stronger when they can explain why they accepted one compromise in order to improve a more important outcome.

## Diagram 2 • Intermediate assessment workflow



### Language to use at intermediate level

Geometry review • Layer direction • Trade-off management • Cleanup burden • Printability • Reasoned plan

The workflow diagram above shows how assessment, comparison and final planning work together at intermediate level.

## Step 3: Plan support and cleanup as part of the job, not as an afterthought

Support should be planned alongside the object, not added blindly at the end. Intermediate users should think about where support will attach, what surfaces may be scarred, how much cleanup will be needed and whether another orientation could reduce that burden. Support is often necessary, but it always carries consequences.

This matters because the print is not finished when the machine stops. A model that prints successfully but requires heavy cleanup on important surfaces may still be a poor overall result. Planning should therefore include the post-print condition of the part as well as the in-print stability of the geometry.

This step is taken because good print planning includes the whole workflow from start to final usable part. Support strategy directly affects both success and finish quality.

## Step 4: Finish with a reasoned print plan that can be defended

By the end of the planning stage, an intermediate student should be able to describe the final approach in a few clear sentences. They should be able to say what the part is for, what features are risky, what orientation was chosen, whether support is needed and which trade-offs were accepted. This turns planning into a meaningful design decision rather than a private guess.

This also improves learning when prints fail. If the original reasoning is clear, the student can later compare the outcome against the plan and see which assumption was wrong. That makes troubleshooting much more useful than simply knowing that the print 'did not work'.

This step is taken because evidence-based planning produces better reflection, better communication and better improvement over time.

### Key planning reminders

- Assessment should happen before settings are changed.
- Orientation is a planning decision, not an accident.
- Support, finish, strength and time often compete with each other.
- A small test can save hours when risk is high.

### Suggested classroom discussion

- What does this model need to do once printed?
- Which orientation best matches that purpose?
- What risk would justify a test print or redesign first?
- How would you explain the final plan to another operator?

## Vocabulary focus

<p><b>Geometry review</b></p> <p>The process of examining the model's shape for print-related challenges.</p>	<p><b>Layer direction</b></p> <p>The orientation of the printed layers in relation to the part's shape and use.</p>	<p><b>Trade-off management</b></p> <p>Choosing which benefit matters most when every option has some cost.</p>
<p><b>Cleanup burden</b></p> <p>The amount of work needed after printing, especially after support removal.</p>	<p><b>Printability</b></p> <p>How suitable a model is for successful 3D printing in its current form.</p>	<p><b>Reasoned plan</b></p> <p>A print strategy that can be explained and justified from evidence.</p>

## Why this level matters

Intermediate users make better parts because they learn that planning is about choosing the right compromise, not chasing a perfect setting that solves everything.

This skill also makes troubleshooting smarter, because a clear planning decision can later be tested against what actually happened in the print.

### Teacher extension prompt

Ask students to prepare two different print plans for the same model and explain which one they would finally choose. Then ask which trade-off they accepted and why it was the best compromise for that job.