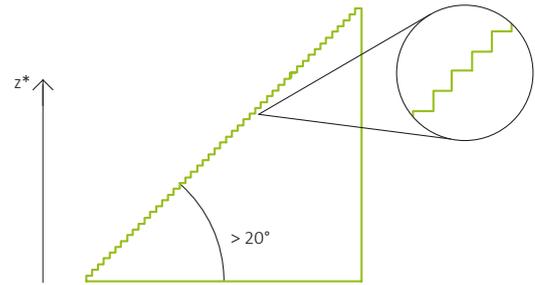


Design recommendations for additive manufacturing

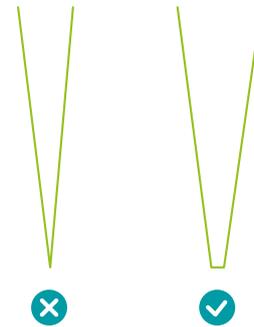
Stepped layer effect

- ▶ Surfaces constructed at an angle of $< 20^\circ$ to the X/Y plane show a clear stepped layer effect.
- ▶ The flatter the incline in the 3D model, the more pronounced the individual steps will be on the surface of the component.



Sharply angled edges

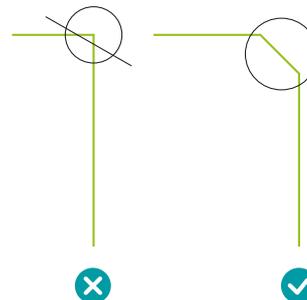
- ▶ Surfaces and sharply angled edges shouldn't taper to nothing (e.g. the blade of a knife).
- ▶ Instead, sharply angled edges can have a minimal thickness to prevent the formation of undefined edges.



Corners

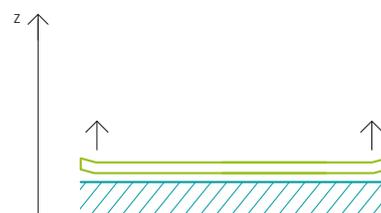
- ▶ Corner points should be slightly rounded. Due to the roundness of the laser beam, it is not possible to create an exact 90° angle.
- ▶ Rounded corner points make it easier to remove powder after production.

Design example: divide the angle of a 90° corner point into two 45° angles



Warpage

- ▶ The risk of warpage increases dramatically when producing:
 - Large surfaces
 - Solid elements
 - Box-shaped components
- ▶ The risk of warpage is dependent on the machine and material.



*Z = direction of layer construction

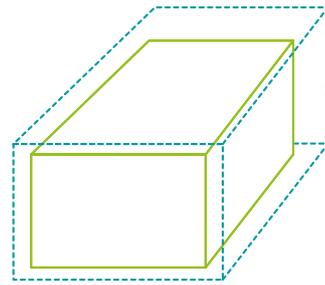
Still have questions on the design of your component? We'd be glad to advise you!



Contact us now:
www.protiq.com
E-mail: service@protiq.com
Tel.: +49 (0) 5235 3-43800

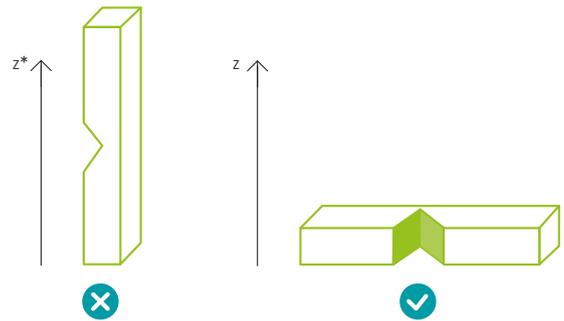
Reworking by machining

- ▶ Machining surfaces must be taken into consideration in the design if the component will be machined at a later stage.
- ▶ The necessary excess material must be considered early on and the corresponding offset incorporated into the design.



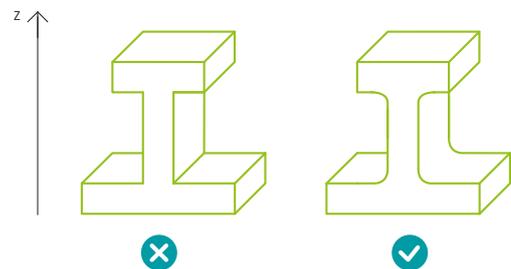
Loading direction

- ▶ Filigree elements (such as integral hinges or engagement hooks) must be configured so that load surfaces are not constructed in the Z direction.
- ▶ The stability of the component will be enhanced if the laser can pull out of the geometry.



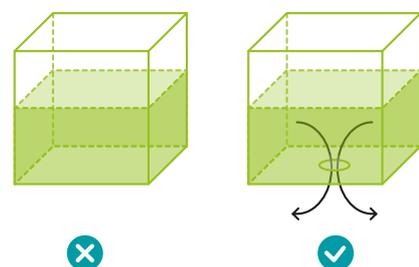
Cross-sectional jumps

- ▶ Cross-sectional jumps must be avoided, since otherwise there could be increased risk of cracking.
- ▶ Gradual transitions reduce cracking with slight rounding.



Cavities

- ▶ Closed cavities should be avoided, since the powder inside cannot be removed afterwards.
- ▶ When there are cavities, closed components should be designed with holes for powder removal.



*Z = direction of layer construction