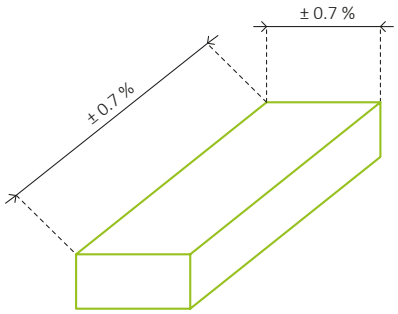
PROTIQ
A Phoenix Contact Company

Design recommendations for selective laser melting

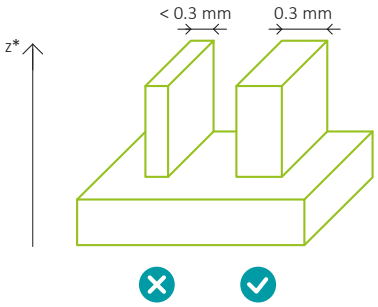
Tolerances

- Shrinkage processes during cooling influence the component dimensions depending on the component size and the material used.
- Manufacturing precision ± 0.7 % of the linear dimension (minimum tolerance ± 0.1 mm).



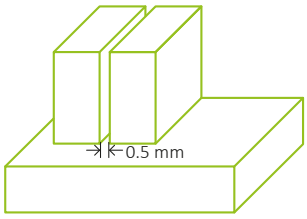
Wall thickness

- Walls can be created with thicknesses of > 0.3 mm.
- The minimum wall thickness in the X/Y plane is limited by the diameter of the laser.



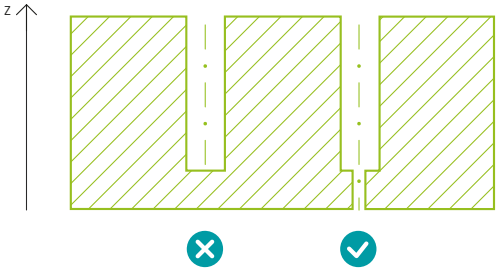
Minimum spacing

- If the spacing between contours is less than 0.5 mm, there is the risk that the cavities will be closed off with material or may even become fused.
- For selective laser melting with copper, the spacing between the contours should be at least 1 mm.



Drilled holes

- Components can be produced with blind holes, but through holes are more suitable.
- To minimize the stepped layer effect and maximize precision, cylindrical components and drilled holes should be oriented in the Z direction.
- The minimum dimension for drilled holes is 1 mm and can be reviewed on a case-by-case basis.



*Z = direction of layer construction

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

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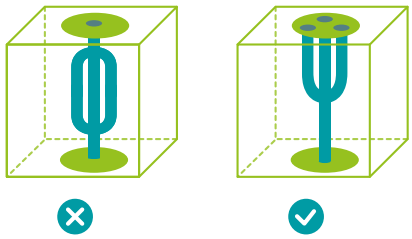
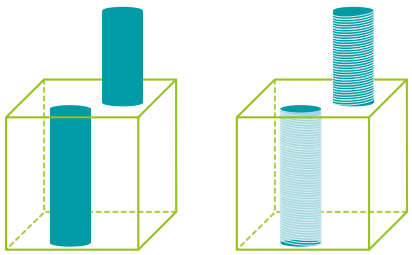
Channels (e.g. cooling channels)

- Parallel systems should always come together again and be accessible from one side in order to avoid "dead corners".
- Soft transitions can reduce the resistance and make powder removal easier.
- For channels with cross-sectional dimensions measuring d > 8.0 mm, channels should be tear-shaped in order to avoid use of support structures.



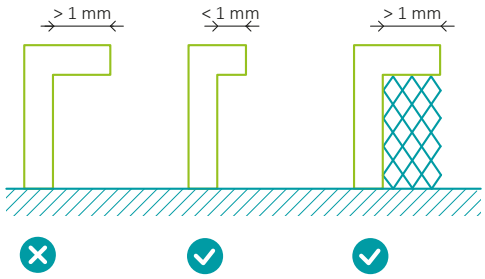
Thread

- With 3D printing, components are produced directly from CAD data. Since most CAD programs only show threads schematically, these must be created during the design phase.
- The smallest printable thread size is M6.
- Threads as small as M2 can be created manually after production is completed. The appropriate core diameter must be created for this.



Free overhangs

- Free overhangs of up to 1 mm can be created without support.
- Larger overhangs require a support structure or rounded corner in order to ensure the stability of the component during production.
- Support structures are removed after the production process.



Support structure

- For angles of < 45° in relation to the construction platform, support structures will be needed.
- Support structures are also necessary for channels with a cross-sectional dimension of > 8 mm.