ARRANGING PA12 SMOOTH PRINTS IN A SINTERIT LISA PRINTER.

USER MANUAL.

VERSION 1.0

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PREFACE

The first rule in arranging a print in the laser sintering technology is to make the section surface of a solid/model as small as possible as this guarantees the best quality-to-durability ratio. With large section surfaces that are also overlapping, there is an accumulation of heat inside the print, which may lead to internal stress of the material and result in the print edges curling up or down, especially in prints with right angles.

1. FLAT SURFACES

In flat and slim surfaces, there is a lot of internal strain and shrinking occurring. Do not lay your models flat! The heat accumulating in the layers may cause your model to bend.

The best solution for this kind of models is rotating them by 45 degrees in every axis. This will help to minimise both the section surface of the block and the heat distribution in all the PRINT BED.

EXCEPTION: Flat surfaces of up to 12 cm^2 consisting of only one layer (e. g. a booklet page).

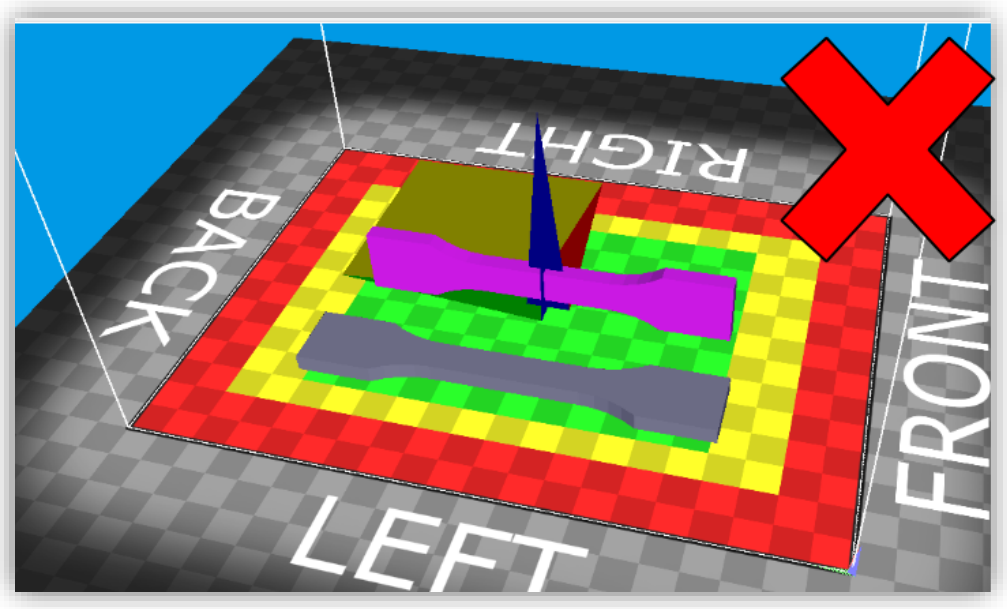

Fig. 1. Incorrect arrangement of a flat model. In both cases, there is an accumulation

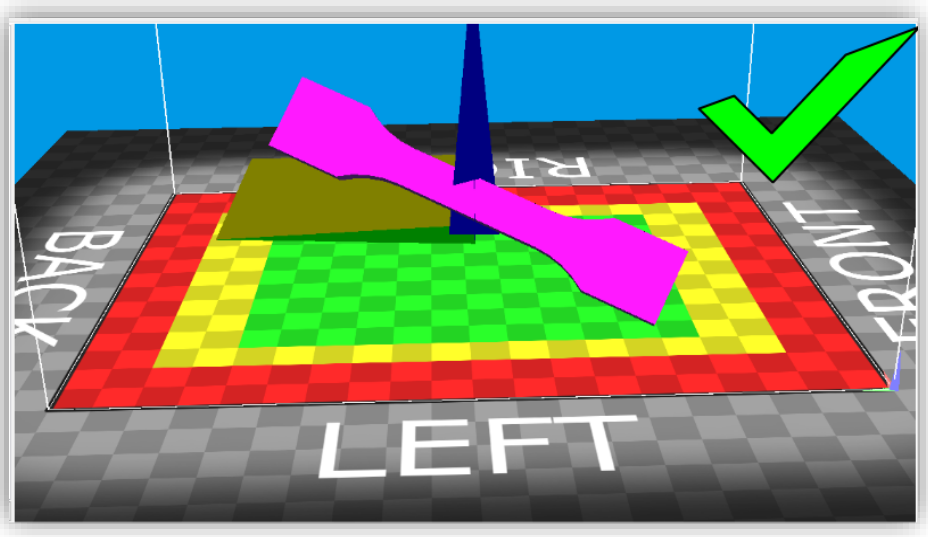

Fig. 2. Correct arrangement of a flat model. The new layers do not cover previous ones.

2. SOLID BLOCKS

The first rule in arranging a model of this kind is to make the section area as small as possible, especially at the base. With solid blocks, there is a significant accumulation of heat inside the block and local stress, which may deform the final product. The bending or curving of the block usually occurs at the corners.

Solid blocks, both those with right angles (rectangular cuboids) and those with acute angles (pyramids, other polygons), must be positioned in such a way that no side of the block is parallel or perpendicular to the BED. It is recommended to turn the model in three axes, in the 15 to 85 degree range (45 degrees for each axis is optimal). Arranging the models at an angle diminishes the heat accumulation in the next layers.

With blocks with irregular angles or rounded surfaces, the rule of the smallest section surface possible also applies.

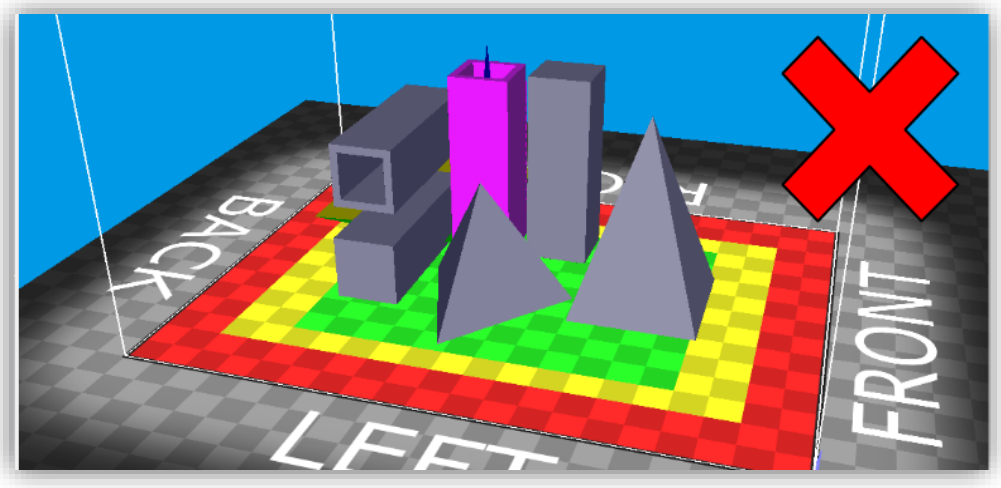

Fig. 3. Incorrect arrangement of solid blocks with flat sides.

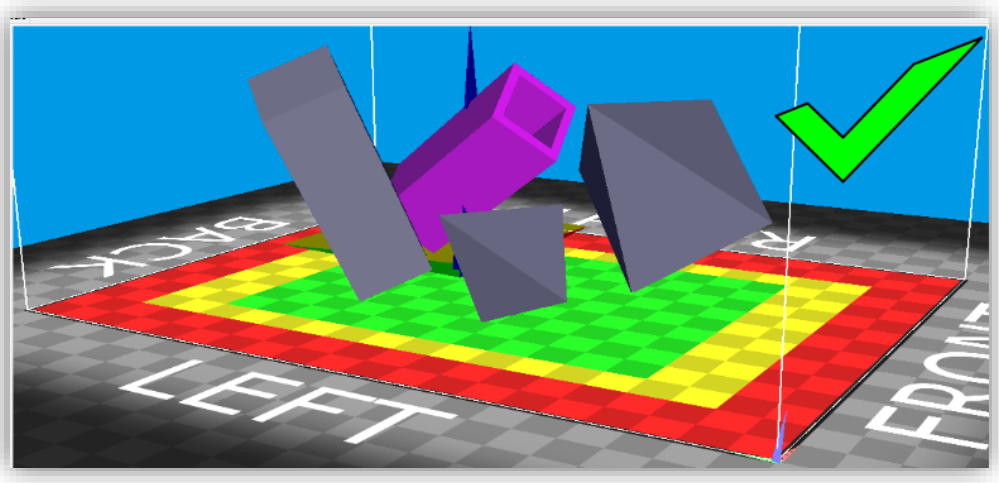

Fig. 4.Recommended arrangement of models.

No side of the sample models is parallel or perpendicular to the BED surface and the section surface at the base is very small, which decreases heat accumulation and diminishes the risk of print deformation.

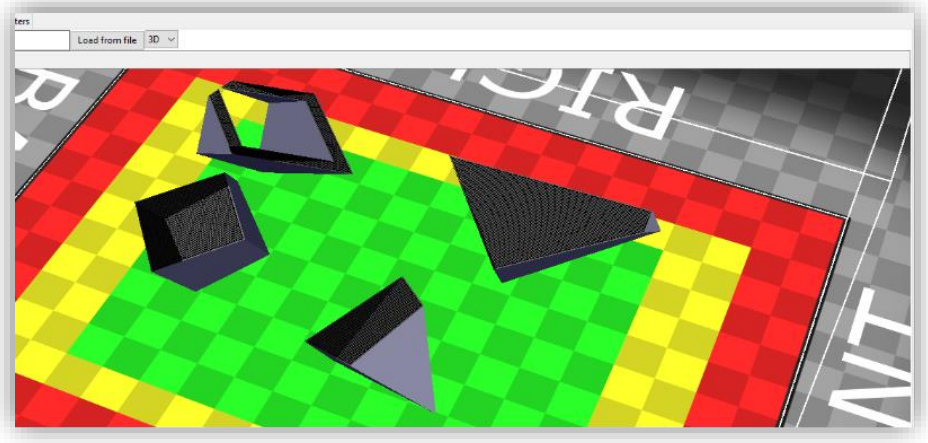

Fig. 5. Cross-section of correctly arranged solids at the 200th layer. A 3D view.

3. SPHERES, CYLINDERS, PIPE CYLINDERS AND OTHER ROUNDED OBJECTS

Given their exterior finish (i.e. the layers in the Z axis being on display), it is recommended to print cylinders and pipe cylinders arranged vertically. If the model is too large and does not fit on the BED, it should be tilted at 15 to 85 degrees.

If the models also have additional details (insets or other protruding elements) that need to be as durable as the main block, arrange them in such a way to ensure the smallest section surface possible. The more layers they have, the stronger and surer their connection with the main block will be.

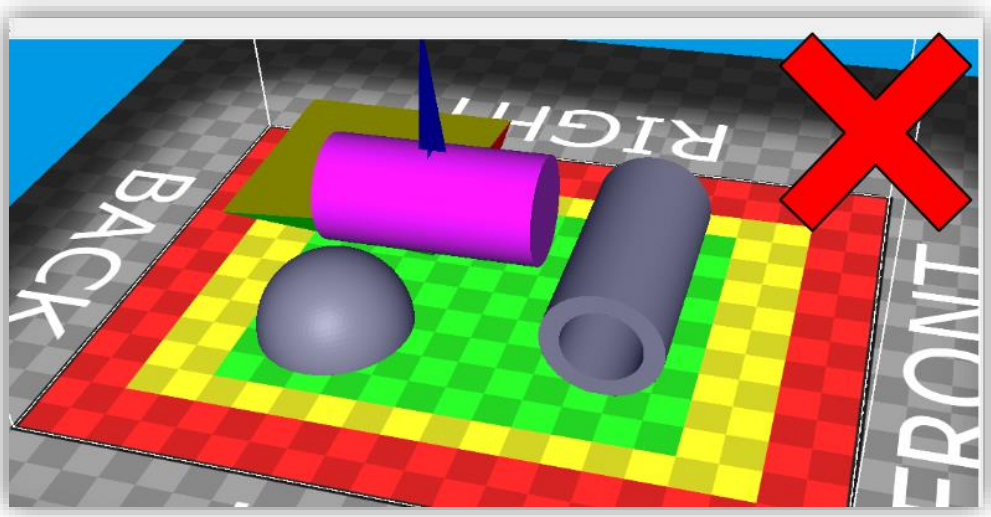

Fig. 6. Given their exterior finish, it is not recommended to arrange rounded/cylindrical objects as pictured above.

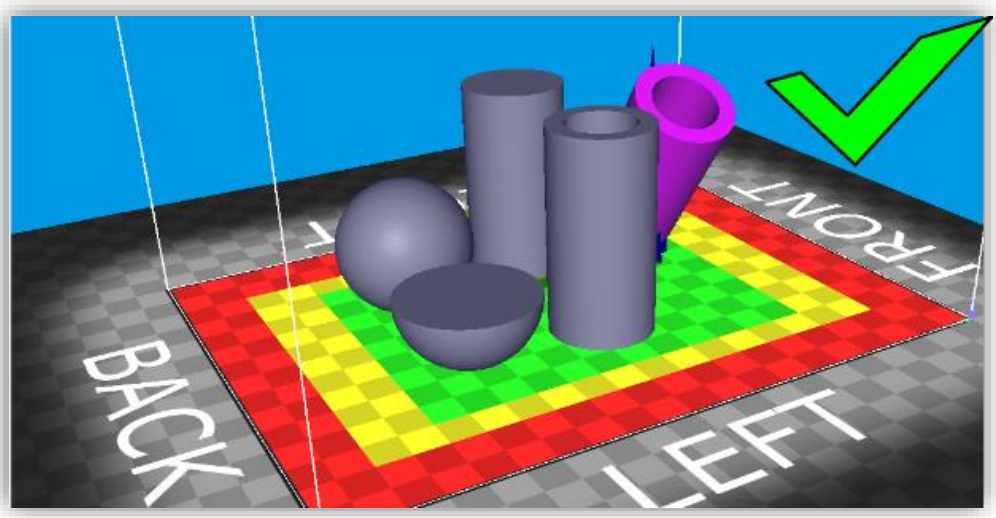

Fig. 7. The recommended arrangement of spheres and other rounded models. This guarantees the best surface finish with regard to the durability of the model.

4. BOXES AND CLOSED BLOCKS

The arrangement recommendation for boxes and closed blocks is the same as for solid blocks. Additionally, be sure not to put such models, especially boxes, upside down and/or cover them with a lid if they come with one. Even if the model's sides are thin, the heat accumulated within the box may deform the print.

It is recommended to arrange such models in three axes and bottom down. The free space can be used for another model.

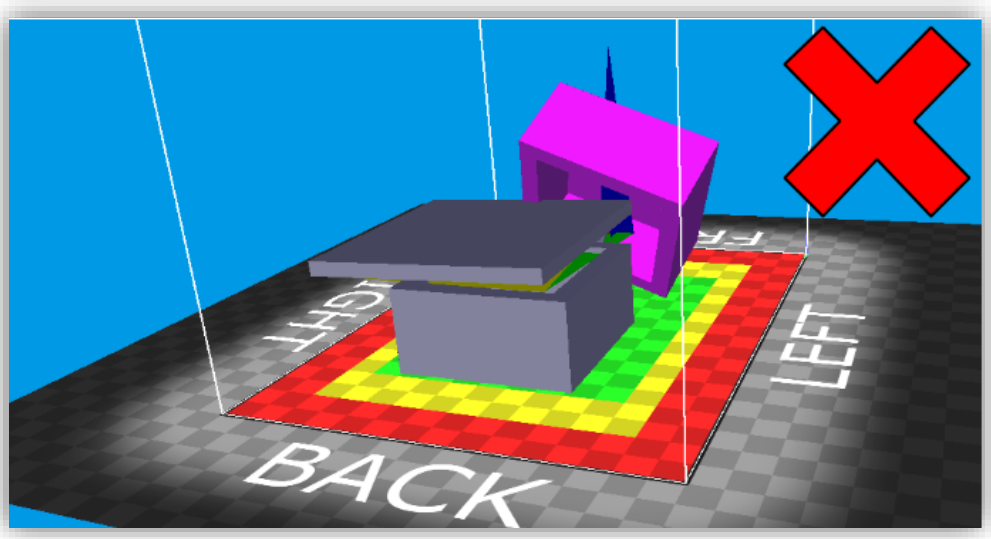

Fig. 8. Incorrect arrangement of box models.

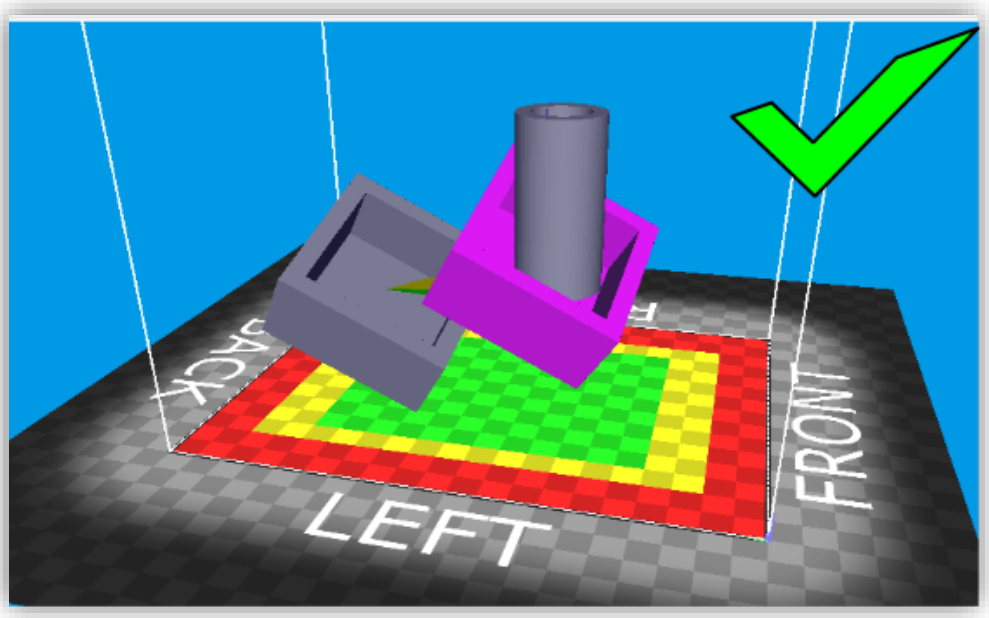

Fig. 9. Correct arrangement of boxes and an example of using the space inside.

5. CONVEX DETAILS

A. SHARP, ANGULAR DETAILS

For the most precise finish, the model should be put in such a way that the detail is facing up. It is essential that the section area is as small as possible – this will make the print stronger and more durable against mechanical damage.

IMPORTANT!

Flat models with sharp details should be arranged at 45 degrees at each axis, with the detail facing up. This angle will allow both correct printing of the flat surface and a defined and strong detail.

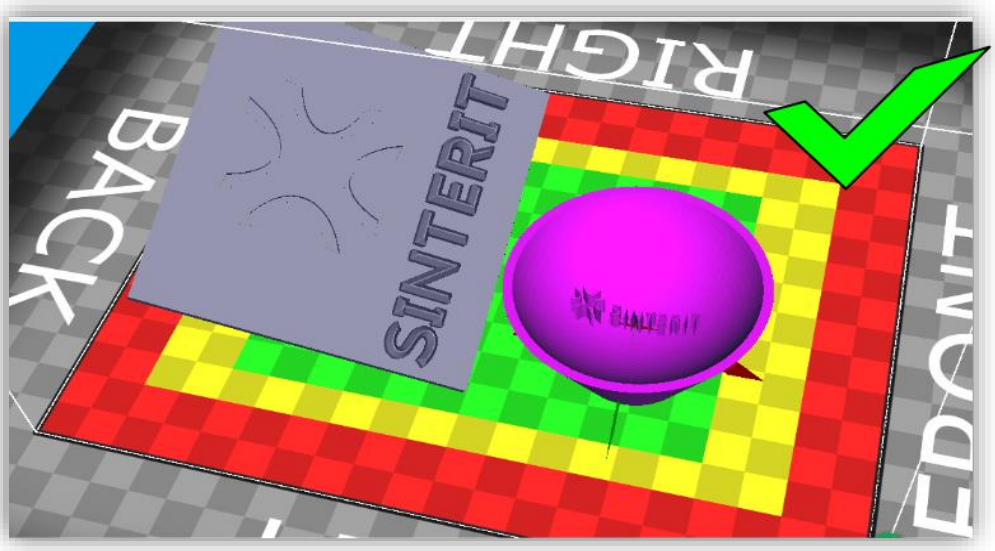

Fig. 10. Defined details, such as inscriptions, should be arranged to face up.

B. FINE, ROUNDED, SOFT DETAILS

In this case, for the most precise finish the model should be arranged with the detail facing down. It is essential that the section area is as small as possible – this will make the print stronger and more durable against mechanical damage.

IMPORTANT!

Flat models with sharp details should be arranged at 45 degrees at each axis, with the detail facing down. This angle will allow both correct printing of the flat surface and a defined and strong detail.

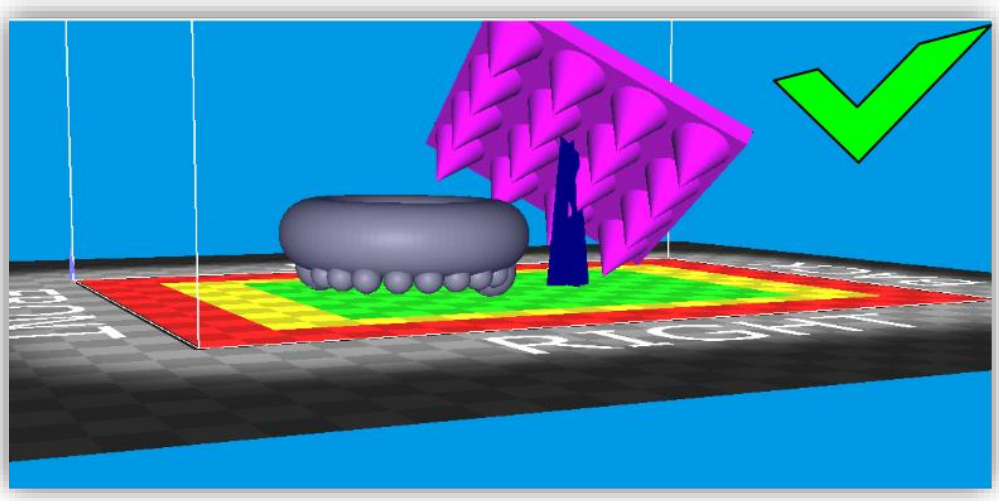

Fig. 11. Arrange the fine, rounded detail to face down.

6. OPENINGS AND CONCAVES

If possible, any openings in the model should be laid flat (axes X and Y) and facing up. Arranging them vertically may result in the opening changing shape e.g. from round to oval and/or not retaining the intended size after printing.

If there is no other way, the model with openings should be arranged at an angle in all three axes.

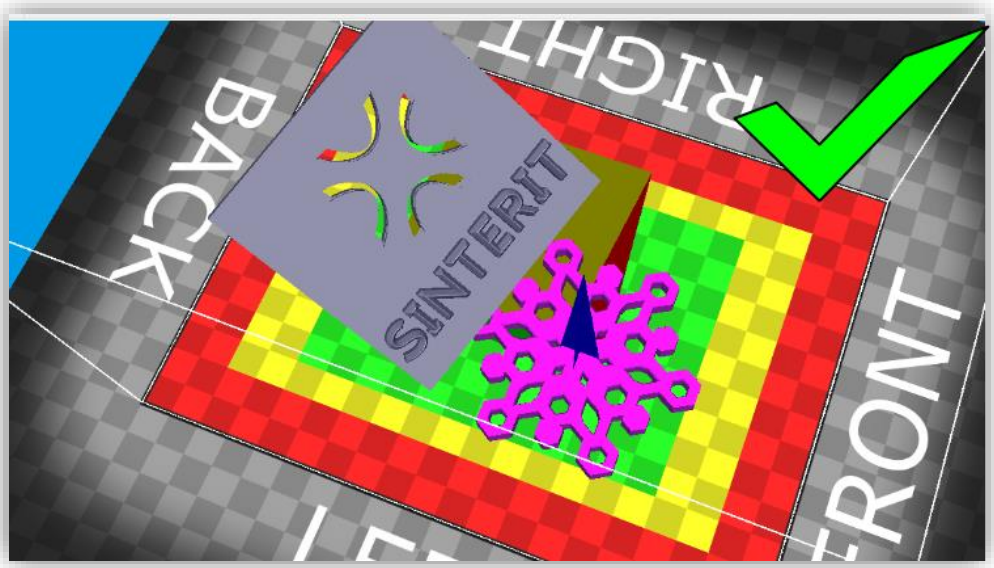

Fig. 12. Correct and acceptable arrangement of models with openings.

7. FINAL REMARKS

- Decide which surface is a priority to you. If you care most about the exterior finish, arrange your prints upside down – this will hide the layers from display (Z-stepping).
- When arranging your prints, optimise the arrangement to follow as many of the above principles as possible.
- If you have any doubts and queries about the arrangement of your print, contact Sinterit technical support.