Checklist | Debinding & Sintering

The following list is there to help you increase the success rate of your parts during debinding and sintering (D&S).

- Does the green part meet the maximum size recommendations given in the User Guideline?
- Was the green part scaled according to the User Guideline?
- Does the recommended height-to-width ratio apply to the component?
- If the green part has unsupported walls, do the part follow the recommended unsupported walls height-to-width ratio?
- Has the extrusion flow been calibrated to ensure that all extruded lines (e.g. outlines) are properly connected?
- Is the overlap between the infill and the outlines over 20 % of the line width?
- Was grid or triangle used as infill pattern if printed with less than 100 % infill?
- Was the bed adhesion helper (e.g. raft) removed after printing?
- Is the boxing volume of the green part considered when preparing a shrinkage plate (dense surface) if necessary?
- Is the bottom surface of the green part completely straightened (e.g. no warping or grooves)?
- Is the surface of the green part finished (e.g. no blobs or stringing or layer delamination or gaps between the extruded lines)?

Checklist | Shipment

Below is a checklist to help you decide whether the green parts are packed in such a way that they will reach the D&S service provider safely.

- Are all green parts packed individually?
- Is each package labelled clearly and distinctively?
- Are green parts wrapped in a packing material (e.g. bubble wrap or foam)?
- Are green parts fully covered with packing material?
- Is a filler (e.g. packing peanuts) used for padding in the shipping box so the green parts cannot move freely?
Recommendations

Parts manufactured with the support layer should be shipped with raft (shrinkage plate) and attached supports. Please do not attempt to separate the support and raft from the parts, as this configuration must be run together through the debinding and sintering process to yield maximum accuracy and probability of success.

Figure 1: Greenpart with support layer and raft (shrinkage plate)

The success of D&S depends to a large extent on keeping green parts free of damage during shipment to the D&S service provider.

The following are recommendations for the packaging and shipment preparation of green parts.

Individual and Safe Packaging

We strongly recommend packing the green parts individually. No matter what packaging material is used, green parts not packed individually can damage each other during shipment.

Figure 2: Example how the green parts should not be packed

To prevent breakage during shipping, pack your parts carefully. Bubble wrap, foam and other packing materials should be used with attention paid to the shape and design of the green part with special attention paid to thin and delicate part features. Make sure that the green part is fully wrapped, and the packing material is fixed effectively.
If bubble wrap is used, we recommend to pack items with the bubbles on the inside. This will keep green parts safely in position, as bubbles are more protected from bursting. It is also recommended to wrap shrinkage plates and D&S support structures separately from their green parts, if not printed with Support Layer Filament. This will minimize possible damage between the plate and green part during shipping.

![Figure 3: Wrapping the shrinkage plate in the film](image)

![Figure 4: Packing the green part together with the shrinkage plate in the bubble wrap](image)

![Figure 5: Packed green part and shrinkage plate](image)

In the case of thin parts like tensile bars it is recommended to wrap them one after the other in bubble wrap as shown below.

![Figure 6: Example of how to wrap tensile bars in the bubble wrap](image)
Clear and Distinctive Labeling

It is important that all green parts are marked clearly and distinctively so that they can be accurately identified. A printed label or written info/note in a package are recommended. It is required to add the Customer Order Details in a printed form to make the shipment and the parts identification unambiguous.

Labels must contain the following information:

- Line number according to the D&S portal service order
- Customer’s name
- Part’s name
- Size of the green part (x, y, z)
- Weight of the green part
- Quantity (in case of tensile bars)
- Material (Ultrafuse 316L or Ultrafuse 17-4PH)
- Thickest wall
- Infill in percentage
- If needed, a note (e.g. use the enclosed shrinkage plate or support structures)

![Image of labeled parts]

*Figure 7: Different possibilities of parts labelling: adding a note (top left); using a printed label (top right); labelling with a foil pen (bottom).*
Safe Packaging

For safe shipping the gaps in the box should be filled. Packing peanuts, styrofoam pieces, and air cushion packaging are very effective in preventing unwanted collisions between parts and shipping boxes.

Please do not forget to fill in and enclose the Customer Order Detail document in your box.

After green parts are carefully wrapped and filler is added to the box, the box should be securely closed. Take care to seal all joins and exposed edges carefully.

Shipping

If you have followed all the instructions, your box is very well prepared for shipping and just needs to be addressed correctly.