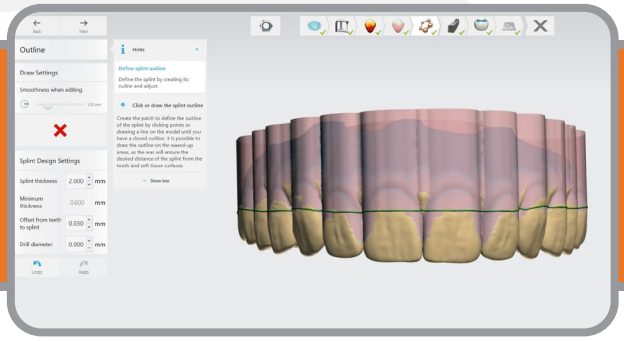
Zirlux® 3D Print Resins

Design and Nesting Parameters CHECKLIST



This checklist outlines design considerations for using Zirlux 3D print resins in dental applications. It supplements, not replaces, the Instructions For Use (IFU) from Zirlux and 3D printer/CAD software manufacturers. Following these parameters will help you achieve predictable, high-quality results.

General Design Considerations

- ❑ Verify the intended use of the restoration or appliance aligns with the indications of the selected Zirlux resin. [Refer to specific Zirlux resin IFU]
- ❑ Consider and select a Zirlux resin that meets the required mechanical properties (e.g., flexural strength, modulus, hardness) for the restoration/appliance's function. [Refer to specific Zirlux resin IFU and technical data sheets]
- ❑ Evaluate and select a Zirlux resin that fulfills esthetic requirements, including translucency, color, and surface finish.
- ❑ Utilize dental CAD software compatible with the intended workflow and the selected Zirlux resin. 3Shape and exocad are two common CAD providers

Digital Design Parameters

Anatomical Accuracy

- ❑ The design should accurately replicate the patient's dentition and surrounding structures, including occlusal morphology, interproximal contacts, gingival contours, and surface texture.
- ❑ The design should provide adequate adaptation to the prepared tooth or surrounding tissues, as indicated per application.

Functional Requirements

- ❑ The design should conform to the patient's occlusal scheme, providing proper contacts, forces, and excursive movements.
- ❑ The design should ensure adequate retention and stability of the restoration or appliance.
- ❑ The design should distribute stress evenly to minimize fracture or deformation risk.
  - **Night guards/Splints:** Provide adequate occlusal coverage and protection, and ensure patient comfort. Engaging in undercuts will directly affect retention. Flexibility for patient comfort, strength, biocompatibility, and polishability.
  - **Surgical Guides:** Facilitate precise implant placement, provide stability during surgery, and accommodate instrumentation. Biocompatibility (Class I), stiffness/durability for surgery, accuracy for implant placement, and sterilization compatibility.
  - **Models:** Accurately represent the patient's dentition and soft tissues and provide a stable base for further procedures. High level of accuracy for die models, surface smoothness for scanning, and material stiffness.

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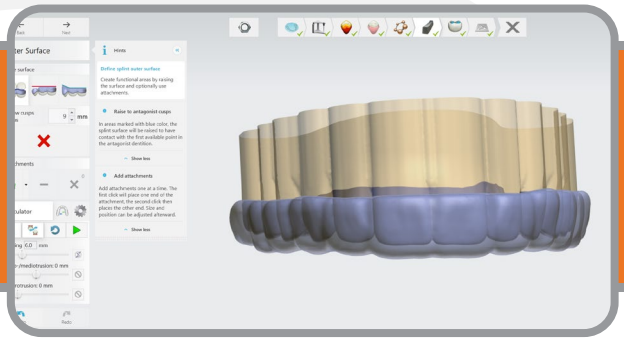

Understanding Three-Dimensional Printing Limitations

- ❑ **Minimum Feature Size:** Adhere to the minimum feature size specified by the printer manufacturer and the Zirlux resin IFU.
- ❑ **Support Structure Requirements:** Minimize the need for support structures. Consider the placement and type of supports required for overhangs, unsupported areas, and thin walls.
- ❑ **Overhangs:** Minimize overhangs; if unavoidable, ensure they are adequately supported.
- ❑ **Internal Structures:** When designing internal structures (e.g., channels, voids), consider resin drainage, cleaning accessibility, and structural integrity.
- ❑ **Multi-Unit Restoration Design:** For multi-unit restorations (e.g., bridges), consider connector design for strength, thickness for separation/post-processing, and location to minimize stress concentration.
- ❑ **Layer Thickness:** Consider the impact of selected layer thickness on resolution, surface finish, print time, and accuracy.
- ❑ **Build Volume:** Ensure the design fits within the 3D printer's build volume.

File Preparation Parameters

STL Export

- ❑ **STL Format:** Export the design as an STL (Stereolithography) file, an open architecture format.
- ❑ **Resolution:** Select an appropriate STL resolution, balancing high resolution for detailed anatomy/smooth surfaces with file size.
- ❑ **File Integrity:** Ensure the STL file is "watertight" (closed, solid volume). Repair any holes or gaps using appropriate software.

Orientation/Positioning

- ❑ **Support Minimization:** Orient the part to minimize support structures.
- ❑ **Preservation of Critical Surfaces:** Orient critical surfaces (e.g., margins, intaglio surfaces) away from support structures.
- ❑ **Resin Drainage:** Orient the part to facilitate uncured resin drainage.
- ❑ **Stability:** Ensure the part is oriented stably during printing.
- ❑ **Z-Direction Accuracy:** Consider orientation to optimize Z-direction accuracy.

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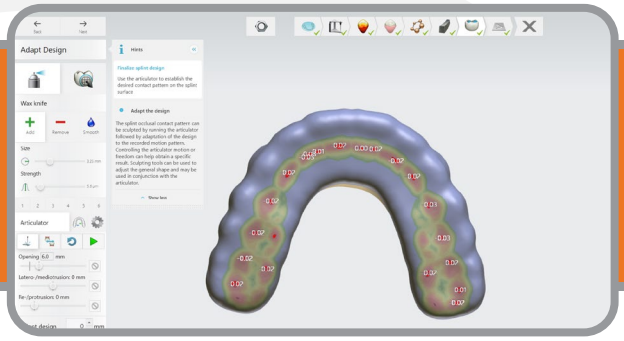

Support Generation

- ❑ **Support Type:** Select a support type (e.g., rod, cone, and lattice) based on part geometry, resin type, and printer capabilities.
- ❑ **Support Density:** Determine optimal support density based on part weight/stability, feature size, and post-processing needs.
- ❑ **Support Placement:** Ensure supports are placed at all necessary locations to prevent deformation and provide adequate stability. Manually add/adjust supports as needed, especially for thin walls, sharp corners, and overhangs.
- ❑ **Base Creation:** Create a stable base to anchor support structures.
- ❑ **Support Removal:** Design supports for easy removal without damaging the part.

Nesting/Slicing

- ❑ **Packing Density:** Maximize packing density while maintaining print quality.
- ❑ **Spacing:** Provide adequate spacing between parts to prevent adhesion, collision, and distortion.
- ❑ **Orientation Consistency:** Maintain consistent part orientation for predictable printing.
- ❑ **Efficient Use of Build Platform:** Optimize part arrangement to utilize maximum build space.

Material Handling

- Follow Zirlux SDS precautions. Wear PPE, including nitrile gloves. Work in a well-ventilated area.
- Dispose of waste materials per local regulations and the Zirlux SDS.

By adhering to this checklist, you can optimize your workflow with Zirlux 3D print resins, achieving improved efficiency, consistency, and high-quality dental restorations and appliances.

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