PREDICTABLE DESIGNS

# Design Review Checklist

## Mechanical Enclosure Design

PREDICTABLE DESIGNS

# Mechanical

| Mechanical resistance | |
|---|---|
| Are the dimensions and material of the part appropriate for the use case ? | |
| Is the toughness of the part uniform ? | |
| Are there no weak points/axes in the design ? | |
| Is the part optimally dense ? | |
| Are there no large flat/linear areas ? | |
| If such areas exist, are the reinforced by ribbing ? | |
| Are any fragile components isolated from potential impacts ? | |

| Thermal resistance | |
|---|---|
| Is the material appropriate for the potential use cases ? | |
| Assuming simultaneous worst cases for heat, light and airflow exposure : will all parts and components keep functionality ? | |
| Is the cooling of the components sufficient ? | |

| Chemical resistance | |
|---|---|
| Is the material resistant to the chemical exposures that it may receive in its use case ? | |
| If components are present that are not resistant, are they properly protected from liquid exposure ? | |
| From gas exposure ? | |

| IP rating | |
|---|---|
| Is the product protected against entry from solid objects of the IP-appropriate dimensions ? | |
| Is the product protected against entry by liquids in the IP-appropriate conditions ? | |
| If gaskets are present : is their fit in their bed correct ? | |
| If gaskets are present : is there sufficient pressure on them ? | |

| Functionality | |
|---|---|
| Are all required movements geometrically possible ? | |
| Are all controls mechanically functional ? | |
| Can fatigue from repeated usage reduce one of the part's resistances ? | |
| Are the component's positions correct when mounted ? | |
| Are the attachment points for components well placed and sufficiently numerous ? | |

## Ergonomics (portable device)

| | |
|---|---|
| Is the weight minimized ? | |
| Are there appropriate handles and/or handling surfaces ? | |
| Are the controls accessible when the device is held ? | |

| Ergonomics (non-portable device) | |
|---|---|
| Is the weight appropriate for the transportation method ? | |
| Are the controls accessible ? | |

| Maintenance | |
|---|---|
| Is the life expectancy of the components roughly aligned and reasonable ? | |
| Can the enclosure be opened with common tools ? | |
| Can the components be replaced with common tools ? | |

| Disposal | |
|---|---|
| Are the materials used in the design recyclable ? | |
| When possible, are the materials used in the design eco-friendly ? | |
| Are the proper disposal instructions/logos inscribed on the parts ? | |

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# Manufacturing

| 3D printing - FDM | |
|---|---|
| Is there a flat base surface ? | |
| Are overhangs from this surface limited or controlled ? | |
| Is the thickness of the walls over 1mm ? | |
| Are there no details smaller than 0,4mm ? | |
| Are there no thin parts perpendicular to the print layers ? | |
| Will the main forces apply perpendicularly to the print layers ? | |

| 3D printing - SLA and DLP | |
|---|---|
| Is the thickness of the walls over 0.5mm ? | |
| Are there no details smaller than 0,1mm ? | |
| Is the part not meant to be exposed to impacts or forces ? | |

| 3D printing - SLS, SLM and EBM | |
|---|---|
| Is the thickness of the walls over 1mm ? | |
| Are there no details smaller than 1mm ? | |

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| Injection molding | |
|---|---|
| Can a two-part mold create the shape ? | |
| Are there no undercuts ? If there are, are cores planned ? | |
| Are draft angles present and appropriate ? | |
| Is plastic flow during injection optimized ? | |
| Are the edges along the flow rounded ? | |
| Are the walls of uniform thickness ? | |
| Are the thicker sections hollowed out, with ribs if necessary ? | |
| Are all thickness transitions smoothed ? | |
| Is the thickness of the walls appropriate for the plastic used ? | |
| If disassembly is planned, are threaded inserts prepared ? | |

| Machining | |
|---|---|
| Does the part have a full cylindrical symmetry ? If yes, use milling. If no, machining. | |
| Can all of the machining operations be made from a single or a few directions ? If yes, use 3-axis. If no, 5-axis. | |
| Are any undercuts properly dimensioned ? | |
| Is the length/width ratio of the tools required minimized ? | |

| | |
|---|---|
| Are vertical corners rounded ? | |
| Are all walls sufficiently thick given the material used ? | |
| Are all drilled holes properly dimensioned ? | |
| Are all tolerances realistically achievable ? | |

| Sheet metal forming | |
|---|---|
| Is the thickness of the sheet a standard gauge ? | |
| Are the bend radii standardized ? | |
| Are all bends in a plane in the same direction ? | |
| Are bend reliefs implemented correctly ? | |
| Are all bends physically possible ? | |
| Are the bend heights and clearances sufficient ? | |
| Is the part appropriate for laser cutting before bending ? | |
| Are all cuts before bending normal to the sheet ? | |
| Is the material appropriate for laser cutting ? | |
| Are all cuts properly distanced from the bends ? | |