PREDICTABLE DESIGNS

Design Review Checklist

Mechanical Enclosure Design

1 MECHANICAL

1.1. Mechanical resistance

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

1.2. Thermal resistance

1.2.1	Is the material appropriate for the potential use cases ?	
1.2.2	Assuming simultaneous worst cases for heat, light and airflow exposure : will all parts and components keep functionality ?	
1.2.3	Are there no weak points/axes in the design ?	

1.3. Chemical resistance

1.3.1	Is the material resistant to the chemical exposures that it may receive in its use case ?	
1.3.2	Assuming simultaneous worst cases for heat, light and airflow exposure : will all parts and components keep functionality ?	
1.3.3	Are there no weak points/axes in the design ?	

1.4. Thermal resistance

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

1.5. Functionality

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

1.6. Ergonomics (portable device)

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

1.7. Ergonomics (non-portable device)

1.7.1	Is the weight appropriate for the transportation method ?	
1.7.2	Are the controls accessible ?	

1.8. Maintenance

1.8.1	Is the life expectancy of the components roughly aligned and reasonable ?	
1.8.2	Can the enclosure be opened with common tools ?	
1.8.3	Can the components be replaced with common tools ?	

1.9. Disposal

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

2 MANUFACTURING

2.1. 3D printing - FDM

2.1.1	Is there a flat base surface ?	
2.1.2	Are overhangs from this surface limited or controlled ?	
2.1.3	Is the thickness of the walls over 1mm ?	
2.1.4	Are there no details smaller than 0,4mm ?	
2.1.5	Are there no large flat/linear areas ?	
2.1.6	Are there no thin parts perpendicular to the print layers ?	
2.1.7	Will the main forces apply perpendicularly to the print layers ?	

2.2. 3D printing - SLA and DLP

2.2.1	Is the thickness of the walls over 0.5mm ?	
2.2.2	Are there no details smaller than 0,1mm ?	
2.2.3	Is the part not meant to be exposed to impacts or forces ?	

2.3. 3D printing - SLS, SLM and EBM

2.3.1	Is the thickness of the walls over 1mm ?	
2.3.2	Are there no details smaller than 1mm ?	

2.4. Injection molding

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

2.5. Machining

2.5.1	Does the part have a full cylindrical symmetry ? If yes, use milling. If no, machining.	
2.5.2	Can all of the machining operations be made from a single or a few directions ? If yes, use 3-axis. If no, 5-axis.	
2.5.3	Are any undercuts properly dimensioned ?	
2.5.4	Is the length/width ratio of the tools required minimized ?	
2.5.5	Are vertical corners rounded ?	
2.5.6	Are all walls sufficiently thick given the material used ?	
2.5.7	Are all drilled holes properly dimensioned ?	
2.5.8	Are all tolerances realistically achievable ?	

2.6. Sheet metal forming

2.6.1	Is the thickness of the sheet a standard gauge ?	
2.6.2	Is the thickness of the sheet a standard gauge ?	
2.6.3	Are all bends in a plane in the same direction ?	
2.6.4	Are bend reliefs implemented correctly ?	
2.6.5	Are all bends physically possible ?	
2.6.6	Are the bend heights and clearances sufficient ?	
2.6.7	Is the part appropriate for laser cutting before bending ?	
2.6.8	Are all cuts before bending normal to the sheet ?	
2.6.9	Is the material appropriate for laser cutting ?	
2.6.10	Are all cuts properly distanced from the bends ?	

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