

MYDESIGN KEY FOB DESIGN OPTIONS

Design Element D: Design concept generation, analysis, and selection

3rd party applications suggested by MyDesign for this project include:

1. File convertor: <http://image.online-convert.com/convert-to-svg>
2. 3D design application: <https://www.tinkercad.com/>
3. Printer driver software: Cura native application for interfacing with the UltiMaker 2+ 3D printer

The process for creating the key fob uses all three 3rd party applications. An image file with the MyDesign logo is converted to a 2D model in the file convertor identified above. The 2D model is passed to the TinkerCad application where it is converted to a 3D model and modified to incorporate design elements as necessary to meet requirements.

Ultimately, the 3D model will be passed to the Cura application for final sizing and output of a printer file to an SD card for the UltiMaker 2+ 3D printer.

The 3D design process is executed in an iterative manner to produce alternate design possibilities for evaluation against cost, schedule, design, and reliability requirements. The decision matrix for the key fob design alternatives is shown below:

DESIGN ALTERNATIVES	DESIGN DECISION CRITERIA			
	Cost of Materials	Time to Print	List of Technical Requirements	Durability
Design #1				
Design #2				
Design #3				

A color rating system will be used:

- Blue – exceeds requirements and is beneficial
- Green – meets requirements
- Yellow – does not meet requirements but needs only minor changes
- Red – does not meet requirements and will require a major redesign

Three design alternatives have been evaluated:

- Design Alternative #1:
- Design Alternative #2:
- Design Alternative #3:

Each of the 3 alternatives has been created and saved as *.stl files for portability between design tools and compatibility with a variety of 3D printers and device drivers. 3D images of the alternatives are shown below:

<caption and picture of design alternative #1 with parts and integrated>

<caption and picture of design alternative #2 with parts and integrated >

<caption and picture of design alternative #3 with parts and integrated >

Evaluation of the three design alternatives against the established design criteria yields the following design matrix:

DESIGN ALTERNATIVES	DESIGN DECISION CRITERIA			
	Cost of Materials	Time to Print	List of Technical Requirements	Durability
Design #1				
Design #2				
Design #3				

Design alternative # <selected alternative> was chosen because <scores and reasoning>.

The selected design will be prototyped and verified against requirements. If deficiencies are discovered during verification testing, the selected design will be revisited and modified to address the problems noted. Each design iteration will be documented as the design progresses toward a product that meets all design requirements.

After verification testing, the prototype will be subjected to validation testing to determine fitness for use. Representative stakeholders will be solicited to evaluate the prototype for usability and aesthetics.

Following verification and validation testing, the product will continue to undergo durability testing through normal use to suggest continuous improvement opportunities.