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Subsystem: Hardware
Class: EE 296 (1 Credit)

XT60/90 Connector Panels:



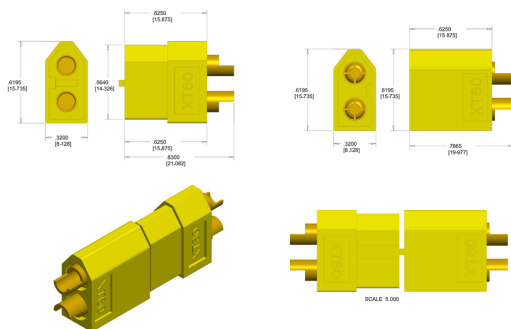
The purpose of this tutorial is to create the wire panels that can be utilized to connect specific wires in order for hardware components to communicate with each other. Additionally, for the battery box to have a way to connect all the battery wires in series in order to obtain the sufficient voltage to utilize the thrusters. The panels will be holding xT60 or xT90 male/female connectors which will be placed on the side of the hardware boxes (both high and low current boxes).

Materials Require:

- xT60 or xT90 Connectors
- 3D printer
- Solder along with soldering iron
- Super glue and glue gun
- Heat shrink along with Heat gun
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Specifications:

xT60 Connector dimensions



xT60 Male (left) Female (Right)



Design Process

The general design process of the panels will be shown below. More explanation of each step will be further discussed later on in this paper.

1. Take at least three measurements of the dimensions of the xT# male/female connectors by using a caliper. Be sure that the caliper is calibrated and is in a consistent unit of measure.
2. Using a writing tool and a paper, sketch out possible designs that would best suit the usability of the panel with the feasibility of the hardware boxes.
3. Using solidworks, sketch out the best design and 3D print the panel (be sure to verify the designs with other team members).
5. Using a filing tool, file any inconsistency (bumps/grooves) within the panels so that xT# male/female connectors can be fitted in.
6. Push in the right xT# male or female for that panel and using super glue or a glue gun, glue down the xT# connectors.
7. Once the xT# connectors are in place, have a soldering station ready and be sure to solder wires to the pins.

Note: Be sure to strip the wires down enough for it to be soldered onto the pins.

9. When all the wires have been soldered onto the xT# pins, cut pieces of heat shrink that will be long enough to overlay the wires so that the exposed wires can be protected from outside elements.

Work of the design:

Below were the possible designs of the xT60 panels.

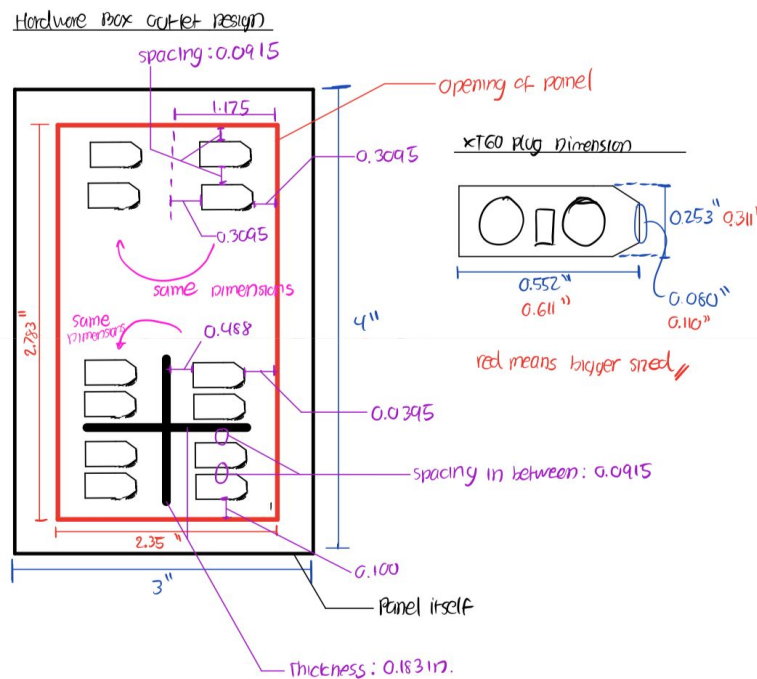


Figure 1: First design of wire panel

In figure 1, the design of the xT60 was meant to connect the servo controllers with the thrusters. However, upon discussing with my team members, we decided to utilize the design in figure 2 since it would be more beneficial for future uses.

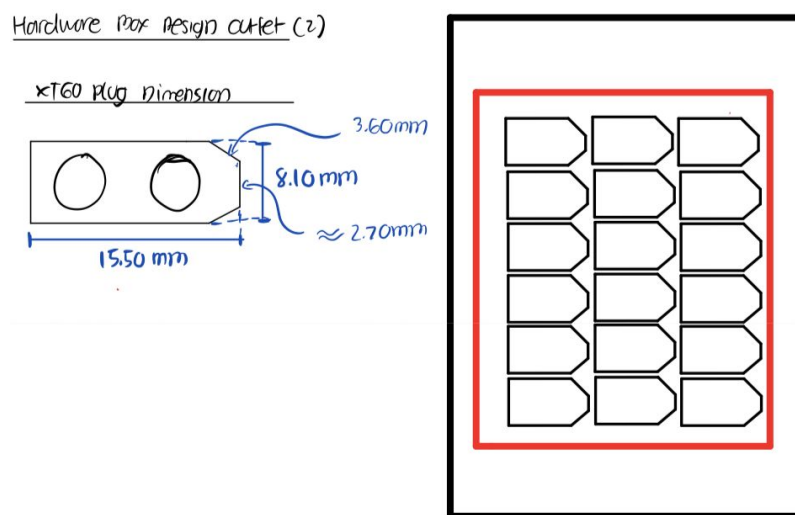


Figure 2: Second implementation of panel design

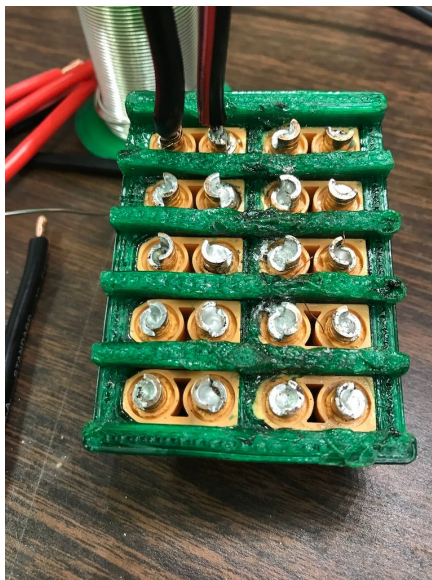
Implementing Design:

The design of the wire panels are implement onto the hardware boxes as shown below in figure 3. In spite of the boat being in the water, a cover was built to project the wires from being splashed from water.



Figure 3: This is an illustration of how the panels are implemented on the hardware box and how they are protected with a cover to prevent short-circuiting

Discussion of the Design:



There were some problems in the process of designing the panels. One of the more important problems that needs to be discussed are the weak points of the panels. When the panel was first 3D printed it was basically a flat board. With little force applied to it the panel can be easily broken. I have fixed this problem by making the separation tabs thicker (as shown in the image on the left). The thickness of the separation tabs not only help reinforced the panels but helped separate the connectors for easy connection.

Comments:

When soldering the wires, there were instances where the solder would not stick to the wire. Also, how the some of the panels were difficult to fix due to the high amount of solder in the groves (as shown in the image above).