Objectives:

In this engineering report, we explore the technical drawing and modeling of a Printed Circuit Board (PCB) using Ansys Discovery.

Understanding Printed Circuit Boards (PCBs):

A Printed Circuit Board (PCB) is a crucial component in various electronic devices, enabling the connection of different electrical and electronic components. This is achieved through layers of copper and silicon, integral to the functionality of many electronic products. Typically, PCBs are encased within enclosures to ensure their protection and operational efficiency.

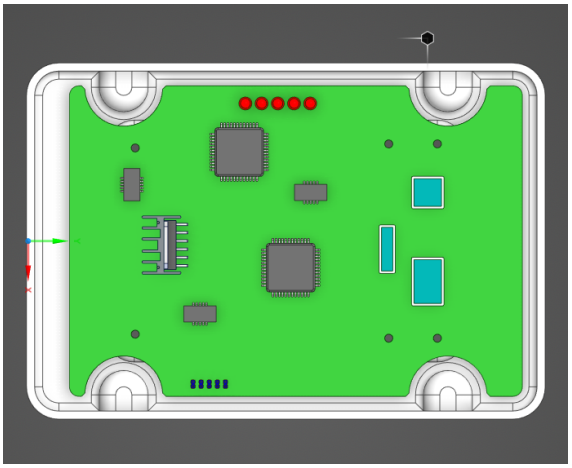
Modeling Approach:

Our modeling process initiates with an in-depth analysis of the technical drawings. The necessary files, including the technical drawing, base model, and assembly components for the PCB enclosure, are available on the Ansys Innovation Courses website. By thoroughly understanding these materials, we'll craft a strategic plan for constructing the PCB enclosure.

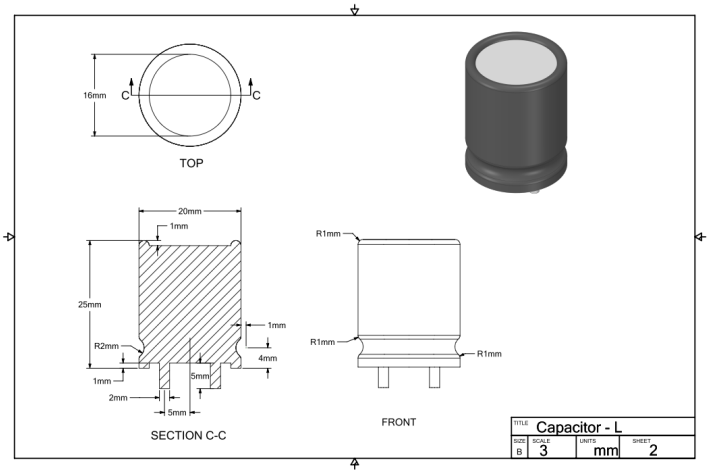
During the modeling phase, we create a capacitor and proceed to modify the enclosure to improve ventilation. This involves the integration of new designs and elements to complete the cooling system, ensuring the PCB operates efficiently. The focus on the enclosure includes modifications for better ventilation, such as adding holes and fans, and assembling heat sinks to manage heat dissipation effectively.

Drawing Process:

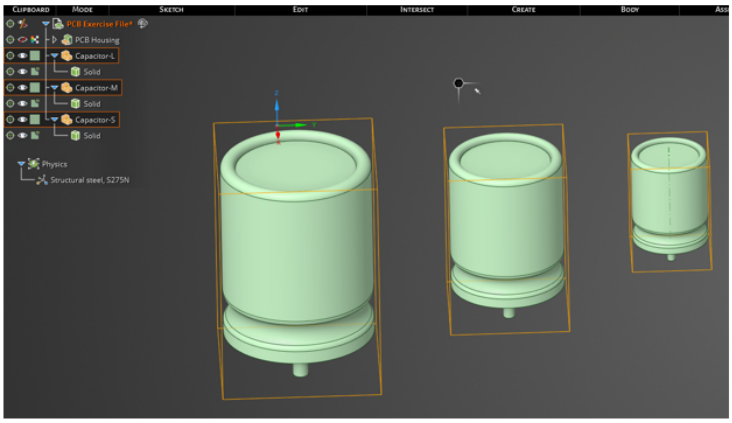
Our design process starts with the base file from the Ansys Innovation Courses website, which we will expand and refine to meet our design goals. Below figure shows the base file:

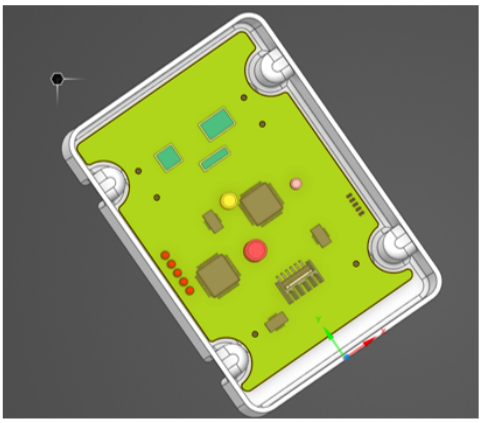


Referencing sheet 2 of the technical drawing, we observe the following details:

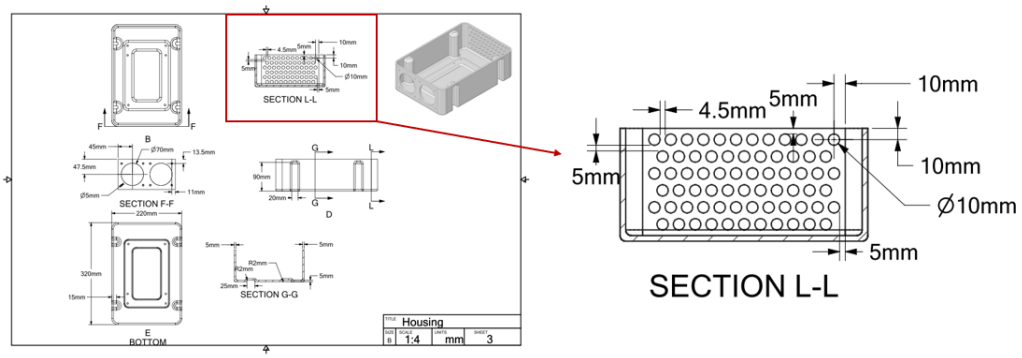


This drawing provides the dimensions necessary to construct a capacitor, a component that stores energy within an electric field, typically situated between metal plates. We will now proceed with the creation of the component shown on the left in the figure. Subsequently, we will integrate the capacitor into the PCB enclosure, ensuring that it is fully and properly positioned within the circuit board, as demonstrated in the figure on the right.

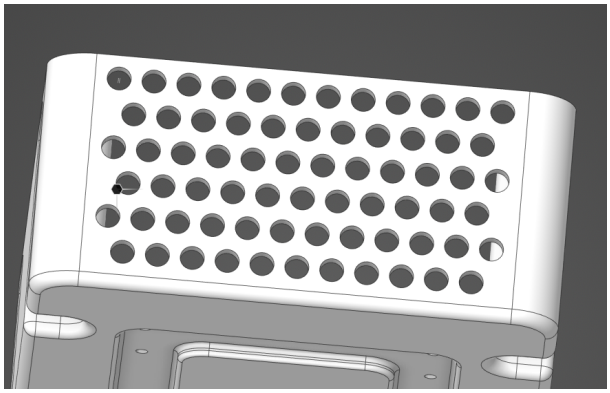




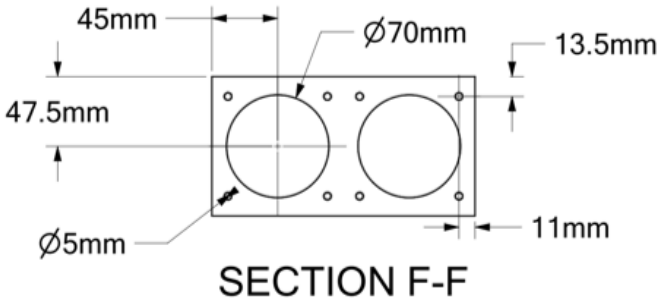
Now, we proceed to add holes to the PCB housing to enhance ventilation. For that, we examine the placement of the holes in technical drawing sheet:

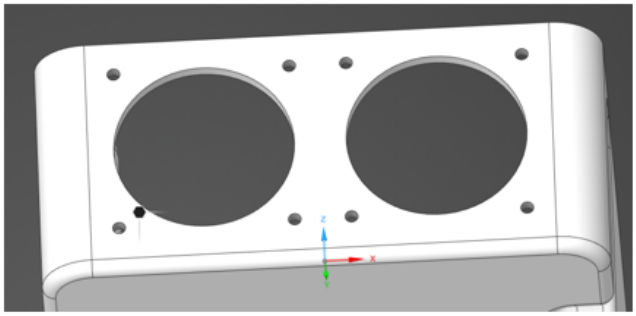


By creating one hole and utilizing the pattern tool to replicate it, we achieve the following result:"

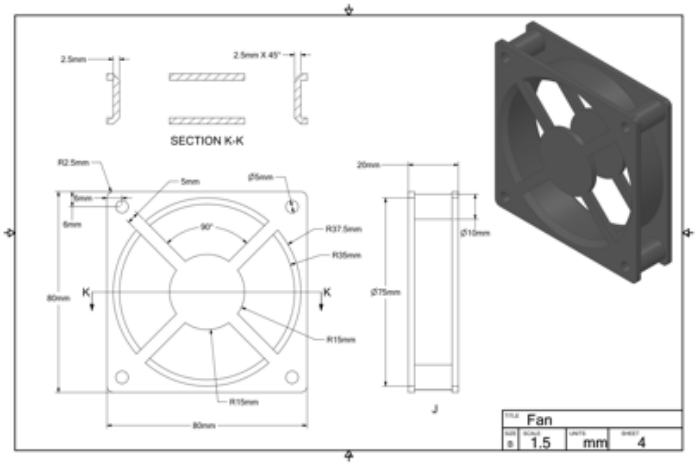


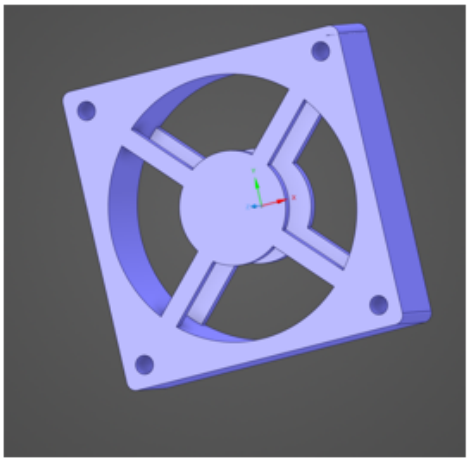
Now, our objective is to designate specific locations on the PCB enclosure for fan installation, as depicted in the figure on the left below. Once this is accomplished, the resulting configuration will resemble the figure on the right below.



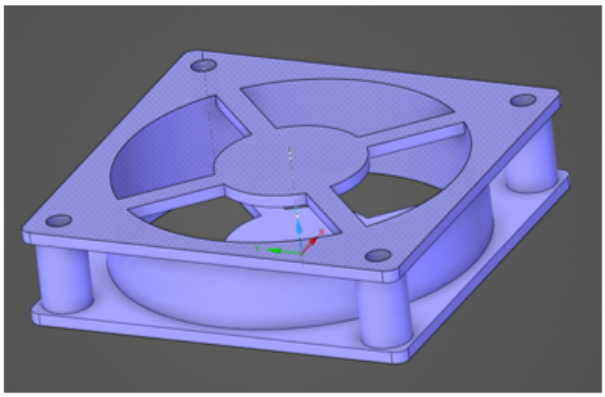


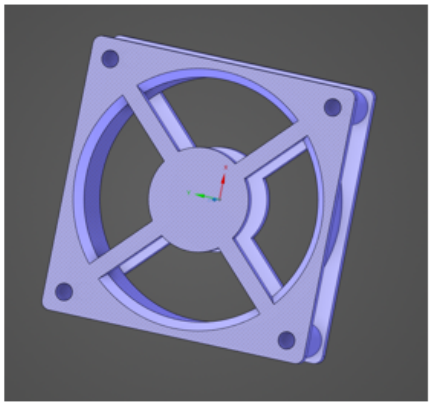
To construct the fan housing, we proceed with the following steps:



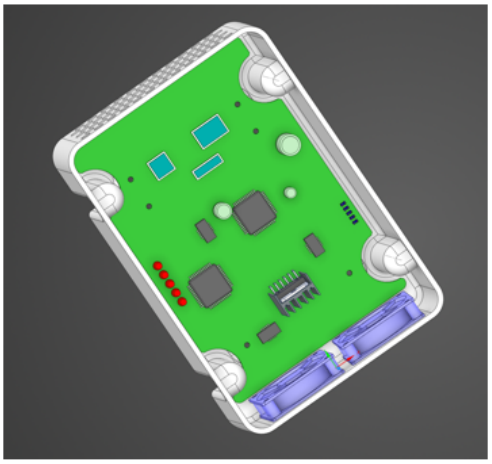


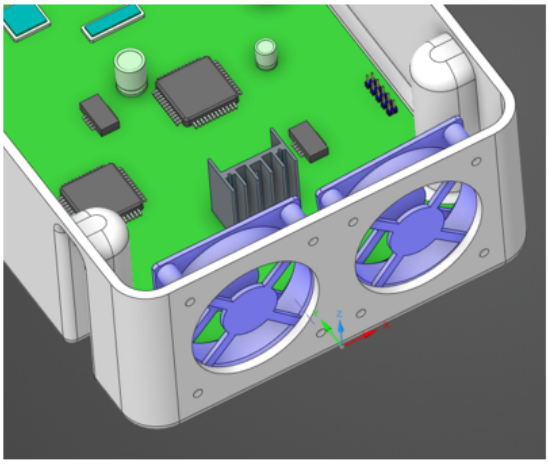
Following this step, we will employ a shell tool to eliminate excess material, as shown in the left figure below. Subsequently, we will utilize the chamfer function to smooth the edges, yielding the configuration depicted in the right figure below.



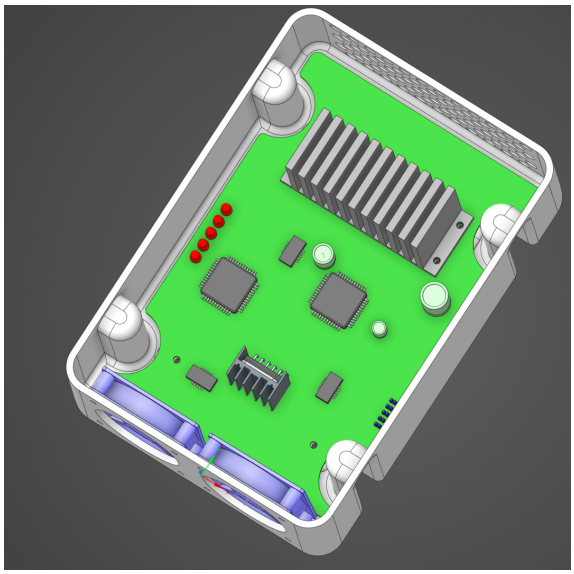


Now, we import the fan models and utilize the align tool to position them as shown below:





Now, to enhance the ventilation for the CPUs, we proceed to install the heat sink as depicted below:



Next, we integrate the heat sink with the CPUs to encompass all the components in the physical model. With this step, our PCB drawing is prepared for thermal analysis.

Reference:

Ansys Innovation Courses