

ASME Student Challenge: Designing for Social Impact

AIM: To create a 3D printable drone-attached container to assist with transporting critical supplies such as aid, medical supplies or agricultural supplies (food, medication, blood packs, seeds, fertilizer, etc.) to rural areas.

Deisgn Description:

- I have designed 3D printable drone-attached container to assist with transporting critical supplies such as aid, medical supplies or agricultural supplies using PTC Creo Parametric 5.0.0.0
- It is a *Polycarbonate* container which has 3 sections inside it for separated storage of food and water supplies and medicines, is any.
- It is designed so as to easily carry a load of 38-40 lbs.
- This container can be latched to the drone.
- Also, there is a force analysis performed on the container.
- All the parts are 3D printable.



Fig 1. The container

Uniqueness:

As it can be seen that the box is unique in its own manner. It has 4 supports at the bottom which help easing the landing procedure.

Also, the container has a wider bottom which is designed in such a way so as to make it robust as it would not take so much damage if ever it takes a hit during motion.

The box opens using a sliding mechanism.

There are latches on two sides of it to get it carried using a drone.

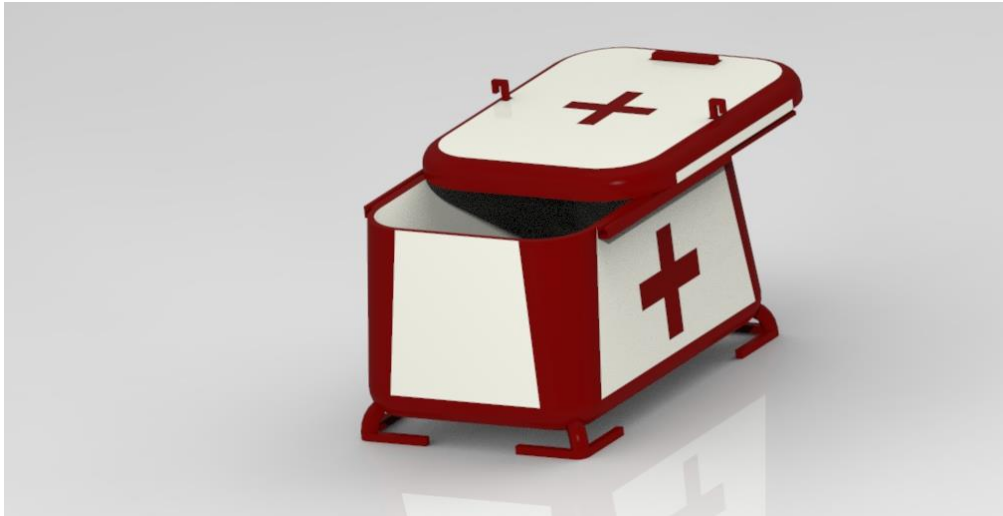


Fig.2 Sliding mechanism

The lid is also design to be aesthetically pleasing as well as providing support to the top.



Fig.3 The lid

Material Reduction:

The material on the main body of the container has been reduced.

Instead of making it thicker at the bottom, 4 supports have been provided to increase strength as well as reduce material usage.

If the supports were not present, the design would have had more space, but approximately 20% more material would have been used to strengthen the design.

Therefore, this is the optimum design.

How the Design Solve the Problem:

What we require here, is a durable container which can withstand any given weather condition and pressure to be accessible to people in need, who cannot be approached easily during the time of need.

This container acts as a food, water, medicine, agricultural supply all at once. It has the required strength to bear the load, proper sections to contain food, water, medicines and/or other equipment easily and distinguishably.

Proof that the container can withstand the load without being deformed:

The following is a screenshot of static load analysis performed on PTC Creo Parametric 5.0.0.0 where 40lbf of load or approximately 180N of force is applied at the bottom surface, giving up only 0.003 inches when a load of 40 lbf is applied to the bottom surface of deflection which is well under the elastic limit for Polycarbonate

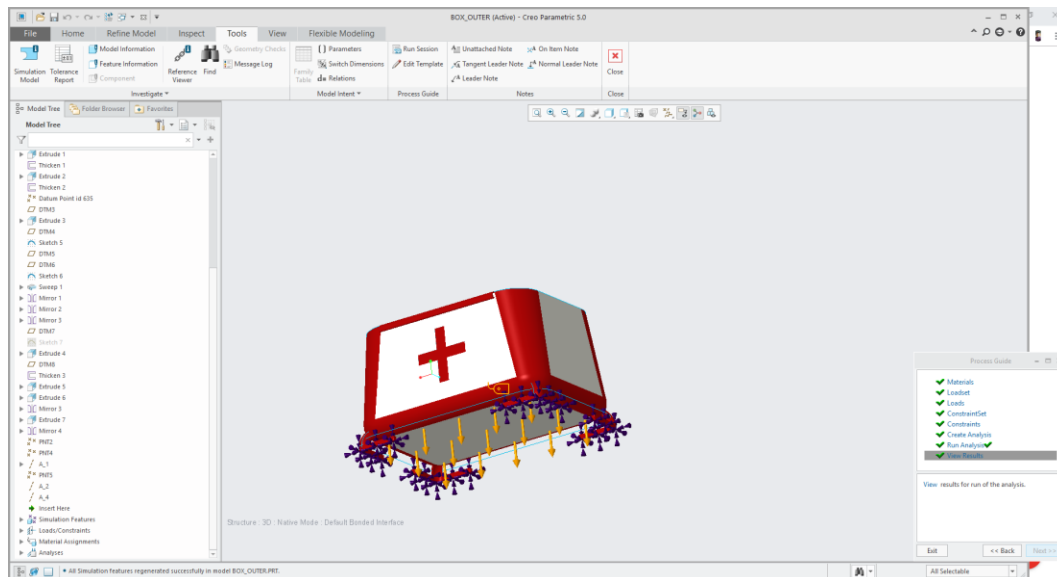


Fig.4 Application of Force and Constraints

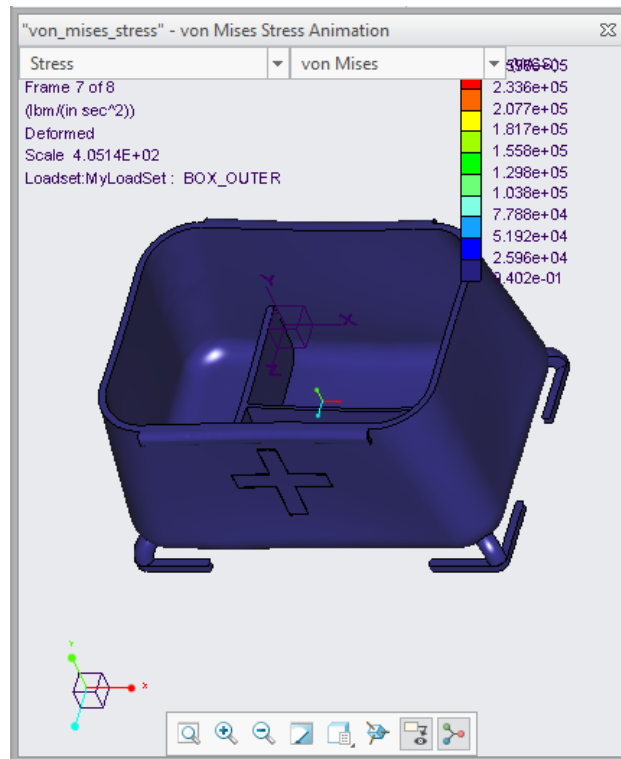


Fig.5

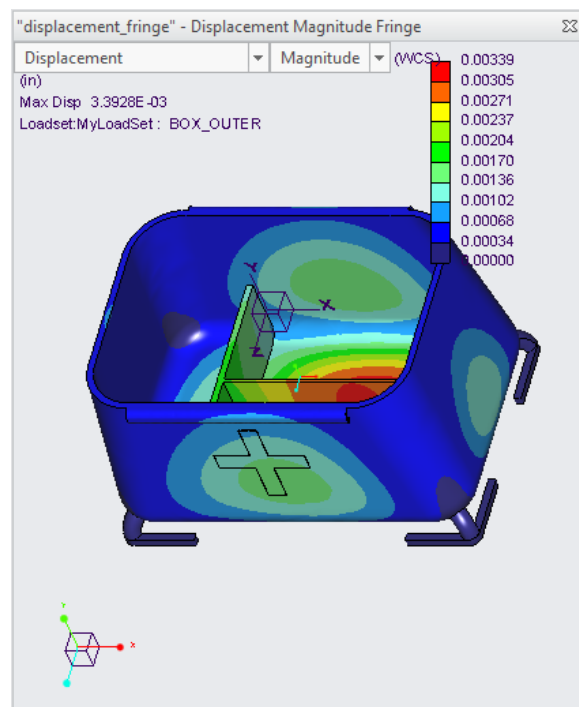


Fig.6

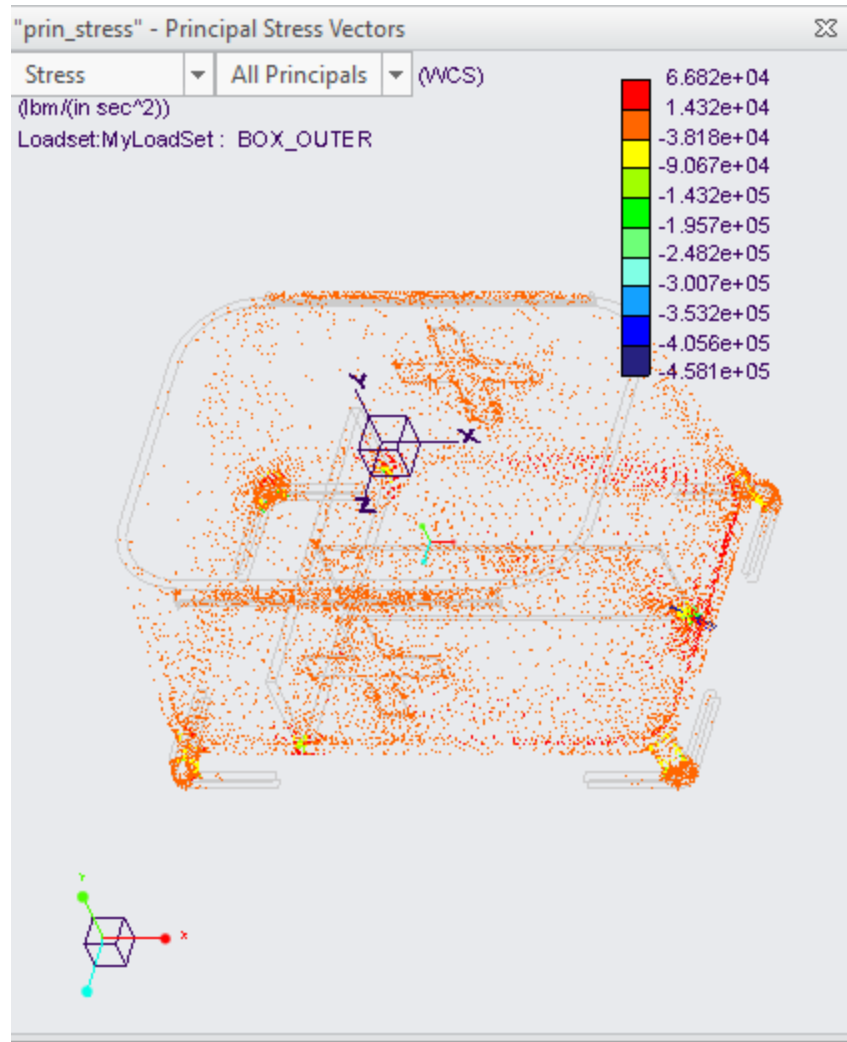


Fig.7

End Notes:

- This has been designed to the dimensions of the printer bed
- The STEP files of the parts are provided.