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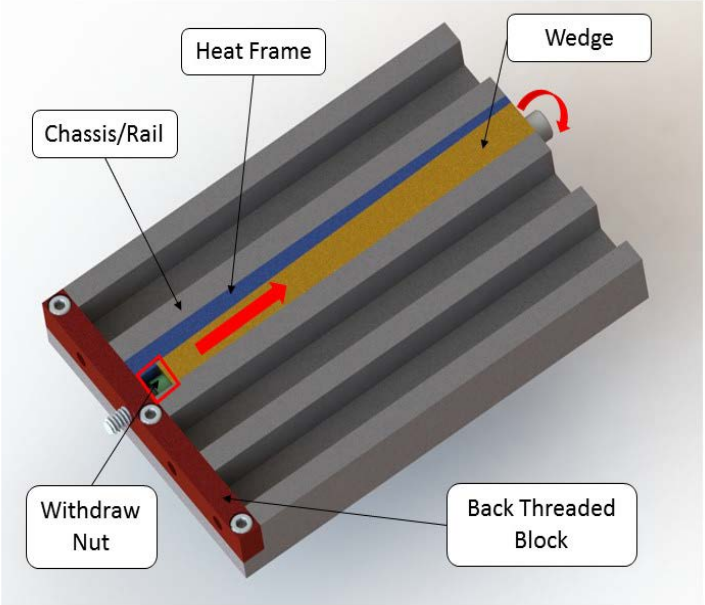
L3 Technologies

Clamping and Heat Dissipation Mechanism

L3 Technologies (L3) is a world leader in electronics and communications solutions for defense and military markets. Currently, in one of L3's communications systems, the company uses a wedge-lock to secure circuit board modules while dissipating heat to a chassis. The wedge-locks tend to bind up, which decreases the longevity of the product. The need for an improved design to increase the heat transfer and durability of the mechanism, while maintaining the clamping force, is needed to improve the efficiency of the electrical components.



This shows the whole system and the terminology that is important to know. The electronics are attached to the heat frame. The Heat frame is inserted into the chassis and the wedge clamps the heat frame to the rails. The withdraw nut Is used to pull the wedge out during extraction.

The wedge-lock has undergone many renditions over the years. Most modifications involved changing the material to decrease the thermal resistance. Our approach was to increase the surface area. The wedge-lock had several gaps in the surface area. These gaps increase the thermal resistance which decreases the efficiency of the electrical components. Our design is a single wedge which maximizes the surface contact which decreases the thermal resistance. Our design decreased the thermal resistance by 16% and increases the uses to failure from 5-10 to 55-70.

Our design helps L3 increase the capacity of their electronics in their communications systems, as well as decrease the number of times the clamp needs to be replaced which also saves time and money. This is also the preliminary research to really make a breakthrough in increasing the capacity of the electrical components by simply using conduction to cool the circuits.

YEAR

2012–13

TEAM

12: Delta H

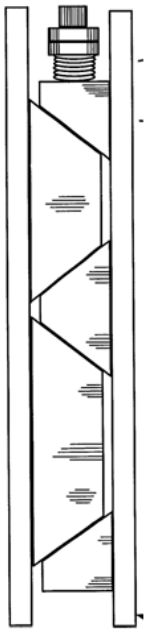
COACH

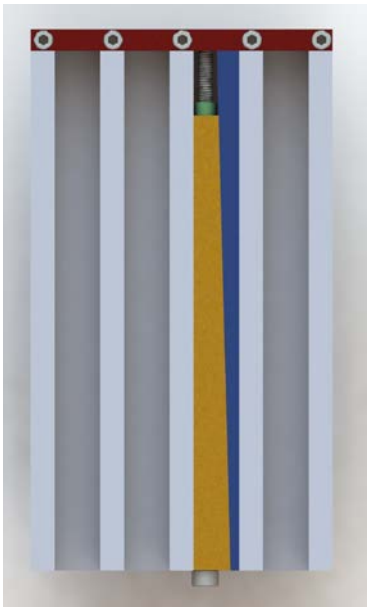
Terri Bateman

STUDENTS

Taylor Cowley, Eric Kuykendall, Joshua Agulia Rodriguez, Cory Robinson, Zachary Vigil

Eric Kuykendall machining the new wedge. We went through several different designs and modifications before arriving to our current design.





Pictured to the left Is the old wedge-lock. Notice the gaps in surface area that Increases thermal resistance.
Pictured to the right is the new wedge. Notice that our design maximizes surface area, which decreases the thermal re-sistance.