Overview
Our group was tasked with designing, building, testing and implementing the structural components of a vertical takeoff and landing unmanned aerial vehicle (UAV). Our end goal was to combine our designed structural components with the necessary electronic components, resulting in a fully functional UAV. The UAV will need to meet several pre-specified requirements, and will perform flight demonstrations at the conclusion of the semester, the day of the Learning Factory Showcase.

Objectives
Our team’s objective was to go through the engineering process and develop, manufacture, and test a UAV that meet requirements set by our sponsors at the beginning of the semester. We must all be capable of flying our completed drone through an obstacle course.

Approach
• Boeing provided us with our customer needs and requirements
• Once we decided upon a quad configuration, we performed a patent search
• Our project did not require us to travel or gather data from our sponsor
• We ran stress analysis in Solidworks to verify our material and configuration selection
• We created CAD models for the frame and landing gear in Solidworks and Inventor
• We bought a test frame and were provided a test frame, creating a prototype was unnecessary
• We tested the landing gear, the actual flight of the drone, and performed a lift test
• Our results were positive, the UAV was flown multiple times with no issues
• By lifting more than the required amount, sustaining over one minute of flight, and completing an obstacle course, we confirmed the performance of our UAV

Outcomes
When Boeing sponsored this project, they did so as a generous donation to Penn State. The goal was to have two teams use the engineering design process to create the structural components of a UAV. The teams would then compete to demonstrate the functionality of their design and obtain practical results. Boeing will not use any of our research for their business. We were victorious in all aspects of the competition.