



FAST Five

Safe and Effective Descending Device for the AFRL



Team Members

MIDN Shawn Cleary	Mechanical Engineering
MIDN Brock Cremean	Mechanical Engineering
MIDN Cody Cordero	Mechanical Engineering
MIDN Chris Miller	Mechanical Engineering
MIDN Nathan Marshall	Mechanical Engineering

Faculty Advisors

Prof. Keith Lindler	Mechanical Engineering
Prof. Steven Miner	Mechanical Engineering

Project Sponsor

Air Force Research Laboratory

Background: The Air Force Research Laboratory University Design Challenge is an annual design competition that invites university teams from across the United States to find a solution to a defense based problem. The United States Naval Academy has competed in the Service Academy portion of the competition since 2012. This year, the challenge is to design a descending system to be able to safely, rapidly, and effectively descend from medium and heavy lift helicopters and tilt rotor aircraft from altitudes in the range of twenty feet to ninety feet. The target customers are Air Force special operations personnel. Fast roping is currently the most prevalent method of getting from the aircraft to the ground for these types of missions. This calls for the operator to grab the fast rope hand over hand, with the rope also passing between their boots. The operator then controls their descent speed by applying pressure to the rope through their hands. In most instances, the only additional gear used for fast roping is a pair of heavy leather gloves that must be removed and stored by the fast roper once they hit the ground.

Objectives: The goal of the FAST Five team is to design and build a system that can insert Air Force Special Operations personnel into combat theaters as quickly as possible while doing so safely and reliably. For the project to be considered a success, the special operators must be willing to adopt the new system over the current system of fast roping in addition to meeting other constraints and requirements.

Results: In order to get the best insight into the issues surrounding the current fast roping system, the team interviewed special operators at the Naval Academy. They also

made contact with a special operator working with the AFRL to touch base and gain insight on the AFRL's desired outcomes.

From the operators at the Academy, the team surmised that while safety was important, most operators wanted a system that got them to the ground as quickly as possible and also made getting on and off the rope as easy and quick as possible. The faster they get to the ground, the less time the entire process takes, which reduces the risk to both pilots and operators. They also told the team that keeping a system similar to the current one was still safe enough to meet their needs. The AFRL point of contact stressed safety more heavily, stating that mishaps like bunching up or colliding on the rope posed a threat to everyone involved in an operation. Another common injury cited was friction burns, which greatly limit mission readiness since operators do so much with their hands.

To this end, the team is looking to create a glove or glove and attachment combination that will allow greater dexterity on the rope while also eliminating heat transfer to the operator's hands. Greater dexterity gives the operator more control over their speed, which will eliminate bunch ups and collisions. The team aims to prevent friction burns to further improve mission readiness once the operators make it to the ground.

The final product for this project is glove system that will allow the operator greater dexterity and control, and also prevent any injury from their descent. Concepts for the gloves and/or attachment design are shown in Figure 1.



Figure 1: Examples of a possible glove or combination of glove and attachment



Figure 2. The FAST Five team at the beginning of the '15-'16 school year, eager to get started