SpeedCap Novelty Hat

Overview
Rocco Venditto, founder of SpeedCap, LLC, came to the engineering team with a prototype of his speed cap. The only problem is that it did not fit one of the team members. The team needed to redesign the headspace to fit a larger population, add an adjustability feature, which is a common feature in most caps, and to add a removable and washable head insert.

Objectives
The goal was to create a removable, washable, and adjustable head insert for the speed cap keeping costs, ergonomics, and design in mind. The team successfully created and tested three speed caps each with their own design.

Approach
• The team first focused on the head inserts. Many concepts were considered for adjusting and removing the head inserts, which were based off baseball caps.
• By considering customer needs and requirements, the team decided the head insert needed to be washable, ergonomic to adjust and attach/detach, and comfortable. The headspace needed to be large enough to be comfortable, but this affected the strength of the polyurethane foam body.
• The team came up with three concepts to test and compare.
• The competition, Fast Cap, was observed and compared to the teams design.
• The team had monthly meetings in person with the sponsor where ideas were shared and materials were gathered from the sponsor.
• The team created two CAD drawings of the speed caps each with different headspace dimensions.
• In total, three prototypes were made each with their own design.
• The designs were compared and tested for wash-ability, durability, and adjustability.
• The designs were wind tested twice on two different people since the shape of the head could determine the maximum wind speed that the caps could withstand.
• The best design was the Velcro adjusting strap with the Velcro attach/detach feature. It was the strongest in wind testing and is the cheapest to manufacture. The worst design was the drawstring-adjusting cap with a snap button feature for attaching and detaching the cap.

Outcomes
• The sponsor will save material costs by using Velcro for both the adjustability and the attaching/detaching features of the cap because it is only one material and one supplier. The other two designs use 2-3 extra materials.
• The team recommends that the most cost effective way to manufacture the foam bodies of the cap is reaction injection molding. This will reduce labor and tooling costs and increase throughput.