**Fabric testing lab (1 hr 15 min)**

**Summary:** Many performance materials are designed for maximum performance and comfort during athletic events.  Here, the students will examine how different materials perform in simulated “game time” experiments and compare performance materials (like those used in club kits the teams wear) compared to everyday clothing.  Metrics to assess include surface water proofing, total moisture absorbance, rate of drying (how well does it wick moisture), wind resistance, etc.

**ILOs:**

1. Execute experimental property testing on performance materials
2. Design an experiment to probe similarities or differences in material options

**Equipment list:**

* Fabrics from A9 (Feel the difference)
* Water in container
* Flame (lighter)
* Tweezers
* Scale (for weighing)
* Scissors
* Graduated cylinder
* Iron-on vinyl, or other waterproofing sprays (for waterproofing)

**Intro:**

We talked briefly about different material properties in A9, in the Feel the Difference activity, where we looked at natural vs synthetic fiber materials. From those observations, some qualities that might be important to test for soccer jerseys and other performance wear might be moisture wicking, waterproofness, wind resistance, how easy it is to tear, and more. Now, we are going to take some fabric samples, and run tests on them to get a sense of how they fare on the qualities we just detailed and outlined.

**Procedure:**

Wind resistance

1. Take the fabric, put it against your mouth and blow as hard as you can
2. If there is significant resistance, then that fabric is more wind resistance, if there is no resistance, then there is little wind resistance

Waterproof

– water contact angle test for hydrophobicity

1. Take a 25mm by 25mm piece of fabric and lay it on a flat level surface
2. Place a drop of water in the center of the fabric
3. Measure the angle that the droplet makes with the fabric

— observations about stretching and pulling on materials

Anisotropy? Moving different in one direction than another

How much can you pull before the fabric breaks or changes? Does it deform or break at all?

– water absorption

1. Use a scale (or the force gauge) to mass a piece of fabric
2. Submerge the fabric into water for 1 minute
3. Remove the fabric from water and allow excess water to drip out
4. Remass the wet fabric
5. Subtract the dry mass from the final mass to quantify the amount of water wicked by sample fabric

Part 2

Try waterproofing some fabrics that are not inherently waterproof!

1. Make sure the fabric you are trying to waterproof is dry and clean
2. Spray/apply on the waterproofing agent
3. Perform the static column test
4. Compare the results before and after the waterproofing. Was it affective?

Flame test

1. Cut the fabric into a 1 inch long thin, long triangular piece
2. Using tweezers, hold the fabric over a flame long enough for it to catch on fire
3. Take notes on your observations, does the fabric burn? What color is the smoke? Does it turn to ask or does it melt? What does it smell like when it is burning?

**Analysis:**

Flame test may not be possible for all locations due to safety considerations

**Discussion questions/debrief:**

See why are soccer kits made with specific types of materials (A14)

**Lab handout needed?**

Yes