**Featured Textile: Orange Fiber**

The selected material, a 100% orange citrus textile, is soft and durable. The woven fibers wear similarly to a silk or viscose textile, while having natural wrinkle-resistant properties. Orange Fiber microencapsulates the natural oils in oranges. Vitamin A, C, and E and can be absorbed through contact with the fiber, creating clothing that is not only functional but functioning. The citrus product’s natural odor-resistance and antimicrobial properties add to the sustainability of the textile, extending the life of the oils by decreasing need for frequent washing.

**Open jumper and flowy options:** The garment flow is designed for ventilation and comfort while traveling. These features allow individuals with physical handicaps easier access to adjust prosthetics or have an aid assisting them. The flow of the garments affects dressing, allowing clothing to slide on with less resistance and catching. The lack of forming to the body allows for no waste patterning as there are very few natural curves and angles required in creating the garment.

**Buckles:** Natural biodegradable clip buckles add closures that can be attached and detached with one hand for ease of use.

**Sheer Panels:** The flat chiffon sections of fabric (shown in grey) are designed as a modesty element while providing ventilation for warmer climates. The goal of this collection is to be wearable in many cultures and climates, so adaptability to various temperatures was an important consideration.

**Additional Design Feature:**

Every apparel item and accessory is designed to be reversible, allowing for twice as many options in half the space. Each garment has the sample print on one side and one-of-four solid colors on the other.

**Adjustability:** Elastic bands in the waist of the pants and in the front of the jumper, increase garment comfort and ease of dressing. The adjustable pull strings on the garments allow for one garment to fit three sizes. The use of S, M, L, sizing instead of 2-14 patterning allows a comfortable and appropriate fit for the customer while using a more sustainable approach to patterning.

**No tie pull strings with cord locks:** The adjustable cords allow for the wearer to customize fit and modify/personalize their look. This method of cord locking, as opposed to knotting, tends to be more comfortable to use for individuals living with mental or physical disabilities, as they are easier to adjust.
Testing Methods

The main selected textile, made by Orange Fiber, claims to have high anti-odor and antimicrobial properties, wrinkle resistance, antioxidant properties, and mosquito repellent features. The Orange Fiber 100% Citrus textile alone is predicted to pass the testing methods described below. With the addition of orange finishes and dyeing, the textile resistance, antitoxin properties, and mosquito repellent features.

**AATCC TM100:** The expectation is that following the TM100 procedure there should be an understanding of the effectiveness of the antibacterial properties, which is merely a portion of the projected antimicrobial properties ability, in the selected textile with or without a citrus finish. The textile being Orange Fiber Fabric dyed primarily with food wastes, and paired with a citrus/bicarbonate finish. The material should have bactericidal properties as it will come in contact with many surfaces and bacteria foreign to the wearer. If it is found to have no antibacterial properties, or even merely bacteriostatic properties, it would be necessary to select new finishes.

**AATCC TM211:** This testing method assesses the outer treated layer of a textile to gauge its level of odor reduction. It would be conducted with the passing materials tested in TM100. This will result in testing the effectiveness of citrus product finishes as an anti-odor-specific antibacterial agent as well as the nature of the textile without additional finishes. It is important to remember that the antibacterial properties of the textiles in regards to odor resistance and reduction are not the same as testing for antibacterial properties in general.

**Additional Testing Methods:** Other tests that could be considered for this collection are AATCC wrinkle resistance and abrasion tests such as TM66, TM93, and TM128 that will judge the wearability of Orange Fiber Fabrics over periods of time. In addition, it would be interesting to apply a test method gauging the mosquito or general insect repellency of the citrus textiles and finishes. A variety of colorfastness methods could be applied as the garments should have high colorfastness in many types of exposure. These methods could include TM61/104/106/125.

**Getting Started:**

- **Survey:**
  - Target Customer:
    - Seasons of Citrus is geared towards women or non-binary individuals ages 25 to 50. The target customer tends to travel often and with variety. They tend to be contract workers, traveling artists, or people looking for an adventure with friends. The target customer is spontaneous and spunky as they explore the world, but also calm, collected, and practical in their approach to life.

- **Designing for Disability:**
  - Special Olympics Michigan provided insights on the specific apparel challenges faced by their athletes. Buckles and pull ties for the garments were selected based on what they had to say. The closures and pulls can be used and adjusted with fewer fingers or with one hand. These were opted for instead of magnetic clasps so they could be used by individuals with pacemakers, and it was decided not to use velcro as it gets scratchy and does not hold up well under moisture. There was concern expressed about tags and irritation. As a replacement, there will be a small line of clear beads along the back neckline seam. The beads will provide a physical marker for people with visual impairments so their clothes are never on the wrong way. Any washing information is separate from the garment on a Braille packing slip. After additional research on designing for disabilities, the goal was to create garments that have the option to be loose and flowy or pulled tight. This way people with physical disabilities will be able to dress more easily and have quicker access to checking or adjusting prosthetics while having the option for a fitted look.

- **Manufacturing/Shipping/and Notes:**
  - This travel wear collection promotes a zero-waste design by working with a rectangular patterning system. Each piece, seen in the simplified draft located in the bottom left corner, should be cut in both the printed material and the nonprinted material. The garments themselves are designed to be reversible, adding to the multiple ways of styling, and allowing the customer to travel with less clothing without feeling limited. Excess material from patterns is used to create the pockets and handbags for the line. To reduce the carbon footprint and production waste, this travel collection is made to order. Production would be based in Italy as a majority of the suppliers are in Italy or surrounding European countries. Every item is shipped in compostable packaging lined with wildflower seeds tailored to the region to which delivered. Recipients can bury the packaging in soil, helping promote the local bee population. All washing/care information is printed on recycled paper.

**More Sustainability:**

- **Main Body Textile/Fibers/Pullicord:**
  - The National Overview places food waste at nearly 25% of all yearly generated human waste. Seeing that 7 million tons of orange waste is dumped each year, Orange Fiber created a process where cellulose is removed from orange waste and converted into a fiber. The Orange Fiber textile produced is fully recycled and 100% biodegradable. Many of the materials needed to extract and convert orange-based cellulose are found in the oranges themselves, helping to reduce outputs in the conversion process. The extraction/conversion uses less resources and energy to produce than most recycled and non recycled rayon materials.

- **Dyeing:**
  - The hemicellulose, lignin, and pectin found in citrus helps remove pollutants from water, creating a more sustainable dyeing processes. Boiling orange or lemon peels to create a dye, leaves the material with a ‘sweet citrus smell’ and can create various shades of yellow and yellow-orange. To achieve the desired colorfastness, it is likely that a mordant would be added, as without it both the vibrant shade and sweeter smell of the material will last only twenty washes on average. Printed patterns will be done with 100% waterless digital printing, the colors sourced and mixed from yellow onion skin, beets, red cabbage, and avocado skin.

- **Additional Textile:**
  - The sheer panels on the garments are a flat chiffon made from 100% recycled polyester PET bottles by ViviTex Textiles. The material is lightweight and sheer, providing ventilation for warmer climates while retaining heat in colder climates. This allows for a larger range of use and increases the garments’ lifecycle.

- **Buckles/Beads:**
  - The shear panels on the garments are a flat chiffon made from 100% recycled polyester PET bottles by ViviTex Textiles. The material is lightweight and sheer, providing ventilation for warmer climates while retaining heat in colder climates. This allows for a larger range of use and increases the garments’ lifecycle.

- **Finishes and Functions:**
  - The minerals and oils found in citrus can be combined with sodium bicarbonate and alkaline powder to hold the textiles properties through the washing process. This finish also works as an odor resistant and antimicrobial finish, offering protection not only from bacteria but also mold and fungi. These properties work to create and maintain an antioxidant and self-cleaning material, enhancing the textile’s sustainability by minimizing the need to wash frequently. A chemical in citrus peels, limonene, can be microencapsulated to add insect repellency to the fabric, which could be especially helpful for travelers.

**AATCC Event and More:**

The colors are selected to compliment a large variety of skin tones, as well as to provided an aesthetic balance, and allow for a larger range of use.