Marketing Textiles in a Digital Format
--understanding 3D material creation--

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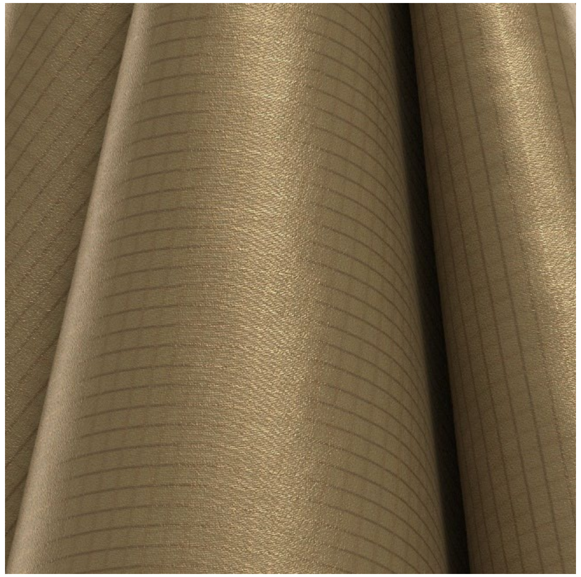
AATCC President 2025-26

What is a 3D Material?

Imaging of Surface

- Data on fabric texture



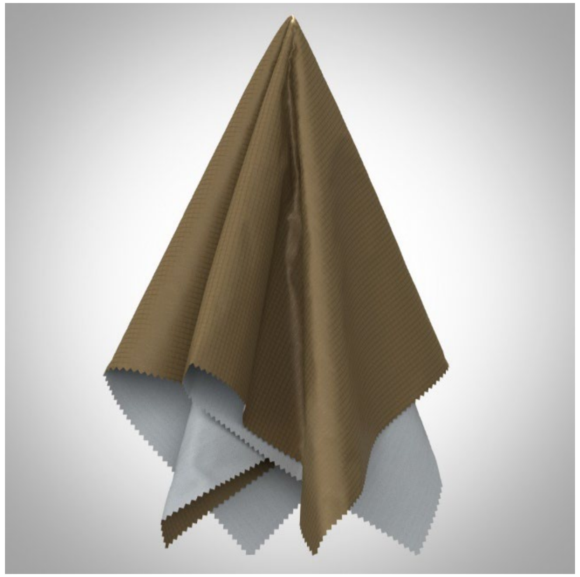
Physical Testing

– Mechanical Properties

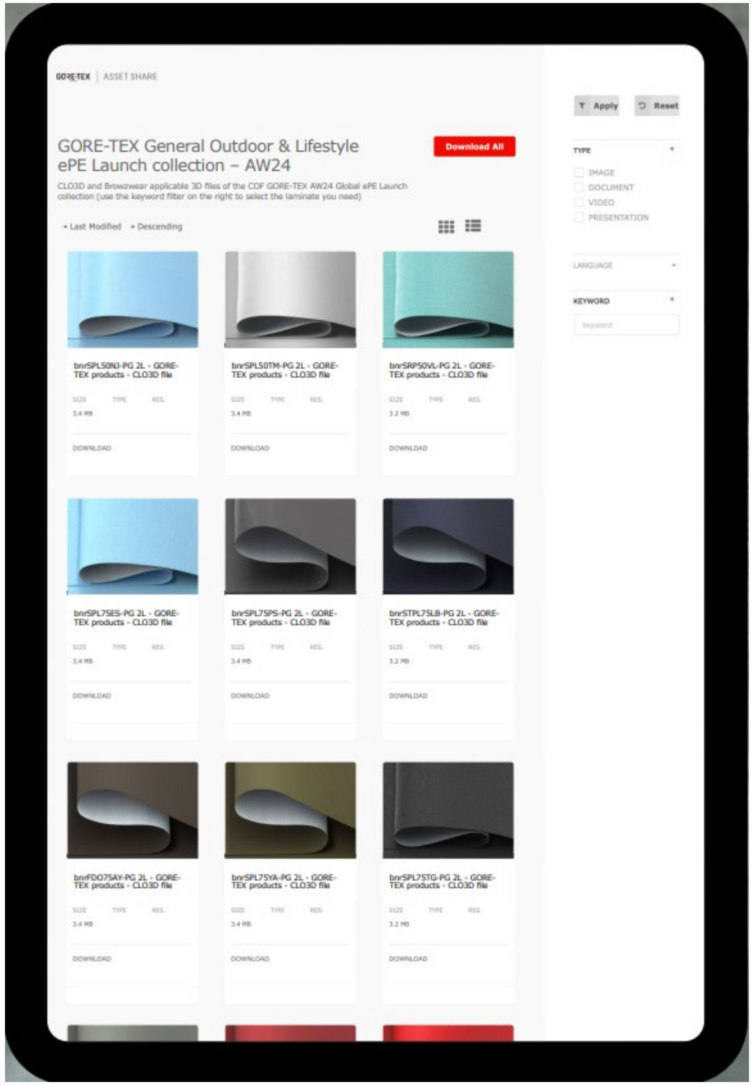
- Weight
- Thickness
- Bend
- Stretch/Elongation
  - Warp
  - Fill
  - Shear/Diagonal

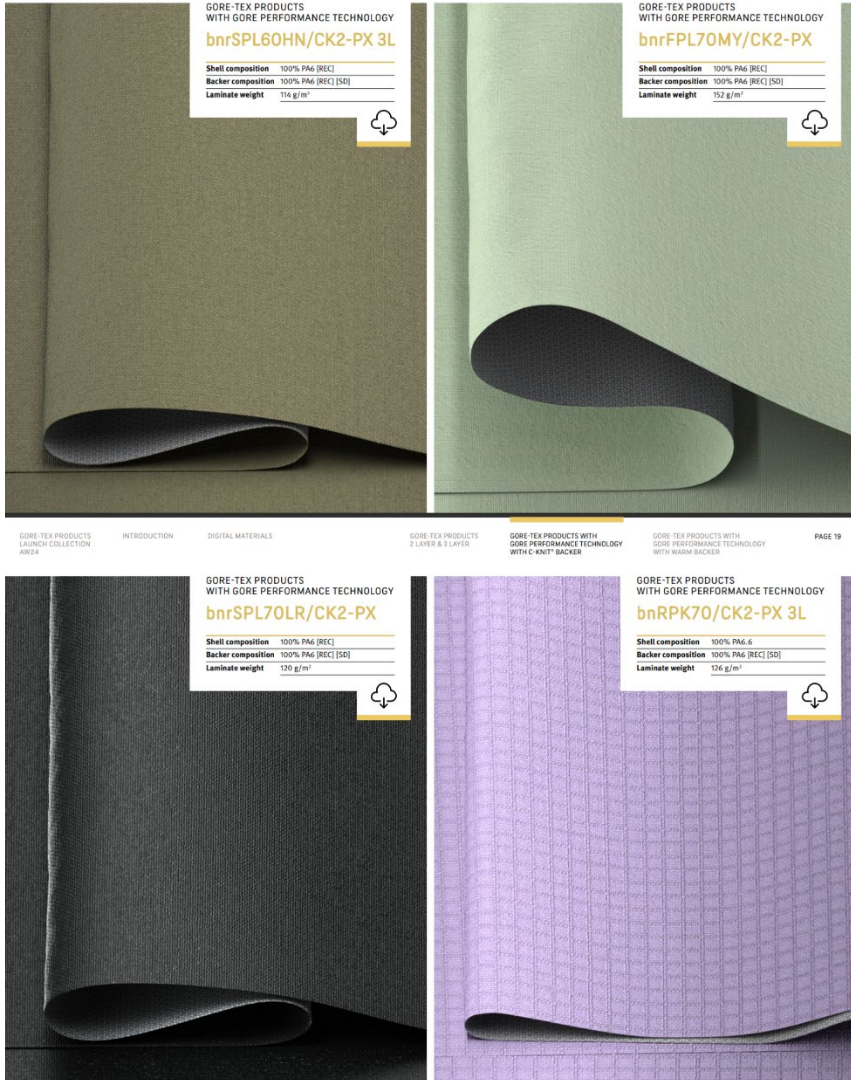
Digital Twin

- **Browzwear**
- **CLO 3D**



Why is digital marketing textiles important?





Virtual textile trade shows

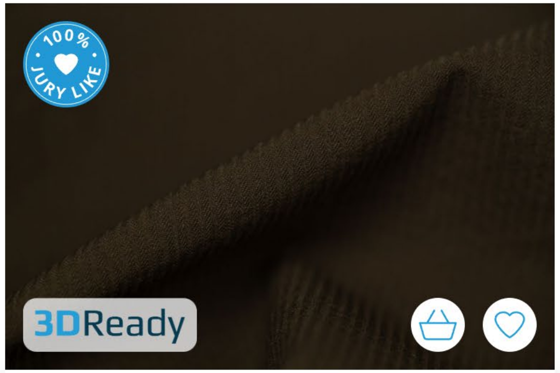
March 2025

128 Products

Omniteksas
5539

Weight: 260 g/m²

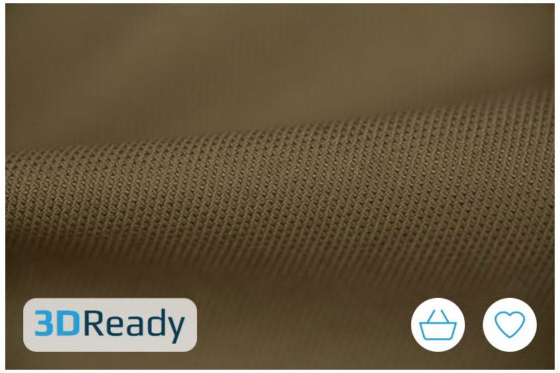
Composition: 87% org. CO, 13% Organic wool



Right Sports Apparels
BabyCord Stretch

Weight: 130 g/m²

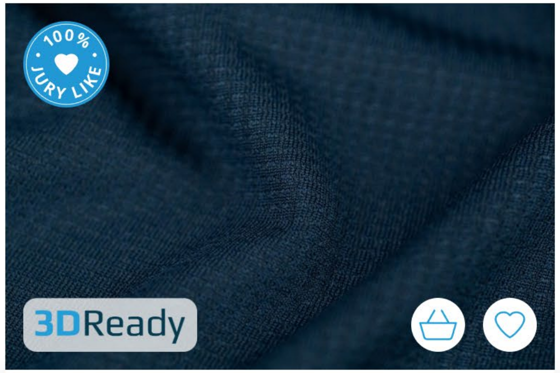
Composition: 15% EA, 85% rec. PA



Chia Her Industrial Co., Ltd.
Banana Hemp

Weight: 221 g/m²

Composition: 2% EA, 78% org. CO, 20% Paper

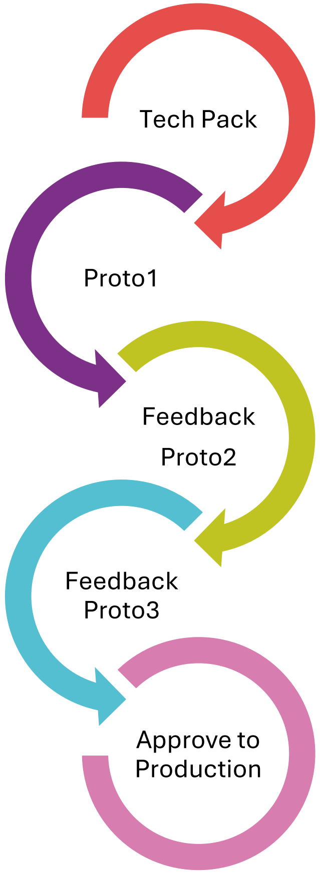


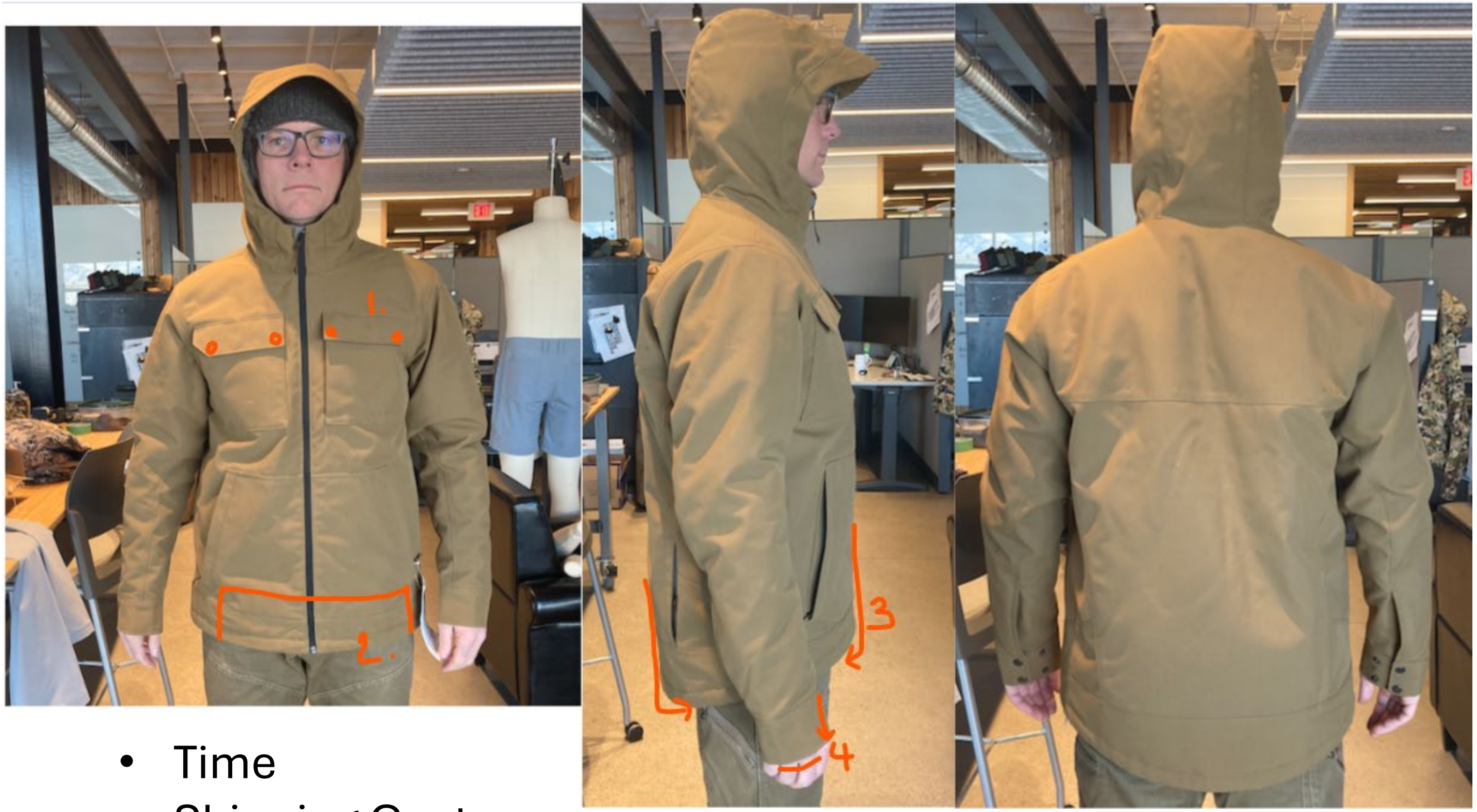
Thygesen & Birk Fabrics
base layer

Weight: 100 g/m²

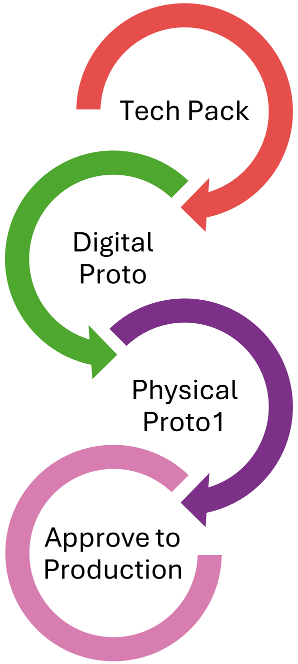
Composition: 100% rec. PES

Digital transformation enables sustainability goals

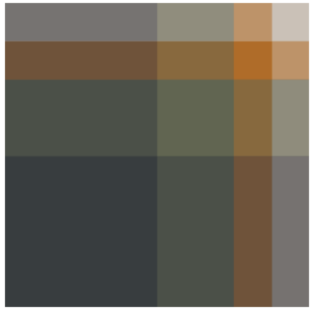


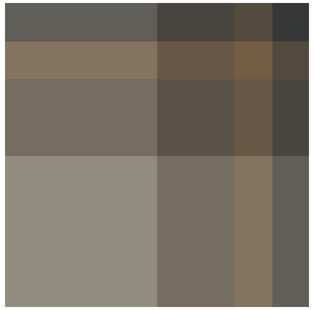


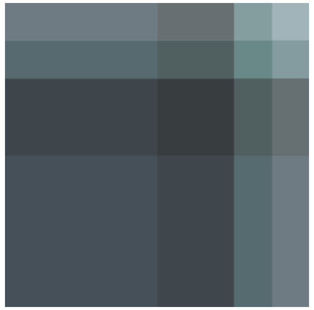
- Time
- Shipping Costs
- Material Costs

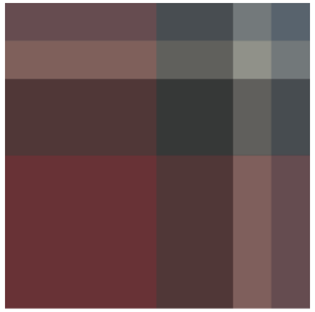


Digital transformation enables speed to market

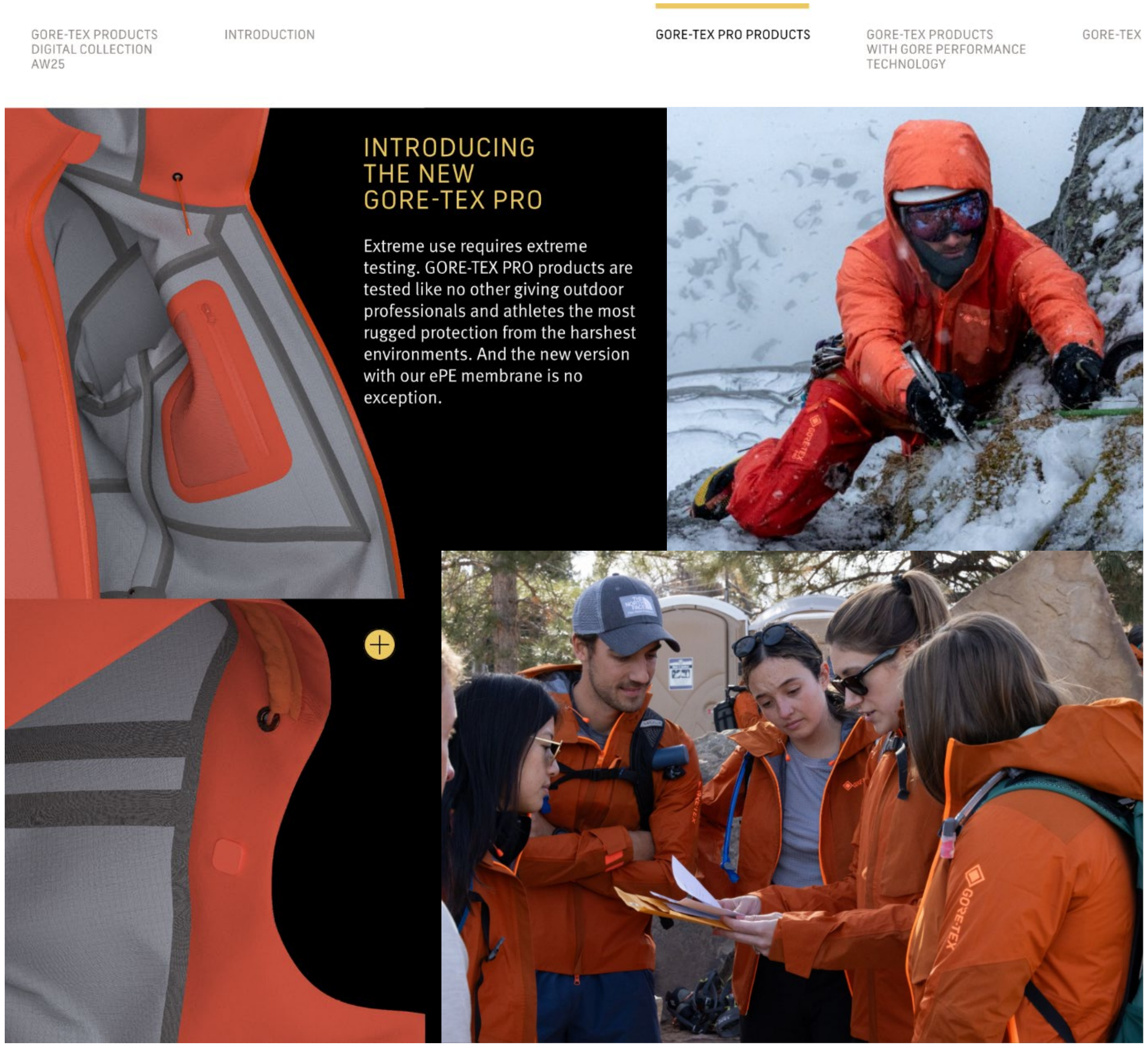








Digital transformation enables faster adoption



How do you get started creating 3D Materials?

- Strong business case
  - Brands are starting to use 3D Design
  - Brands are requesting 3D files
  - Textile suppliers will be seen as innovators
  - Return on Investment
    - Reduction in X sample yardage
    - Reduction in Lab Dips
    - Faster adoption -> purchase orders

- Select 3D design software
- Invest in 3D equipment

- Outsource 3D creation

- Generate content
- Promote to customers

Step 1: 3D Apparel Design Software

- Survey your brands & customers

CLO

OPTITEX

browzwear

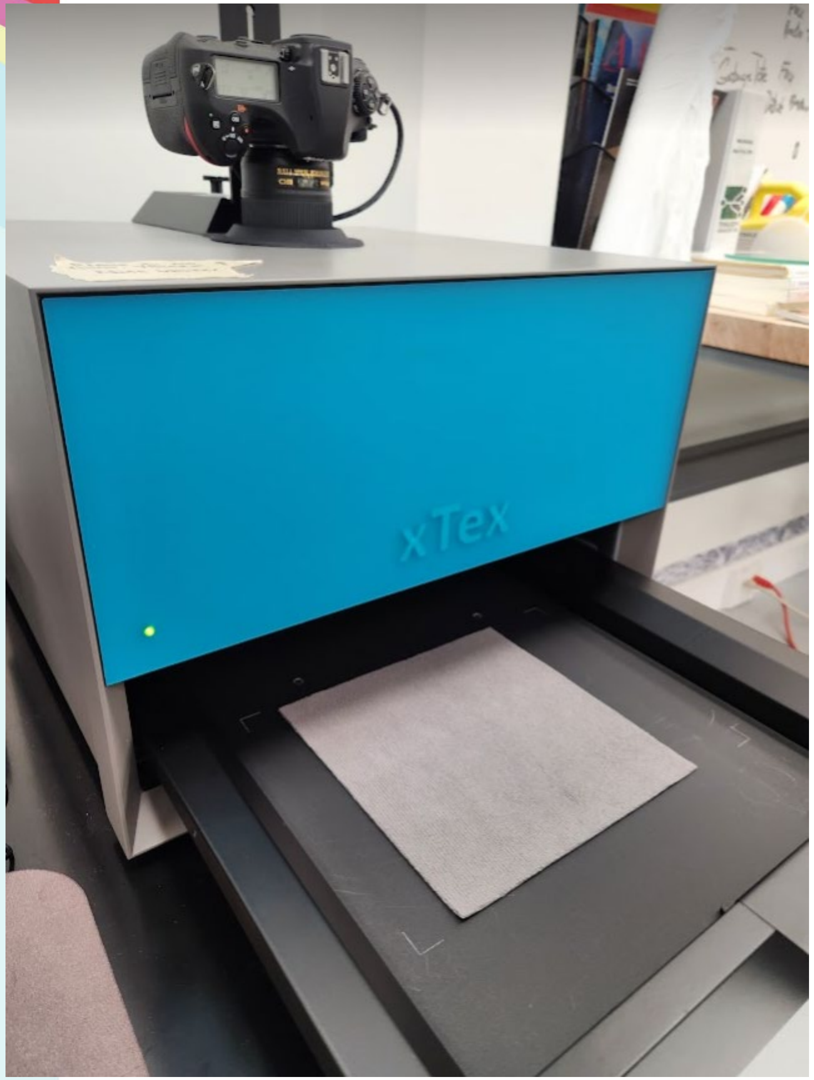
ASSYST

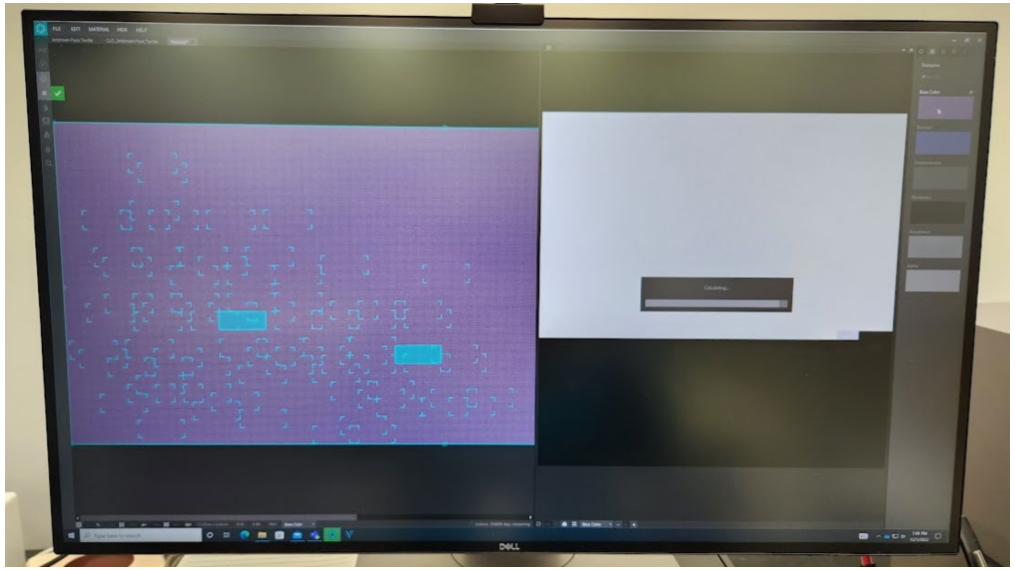
GERBER TECHNOLOGY

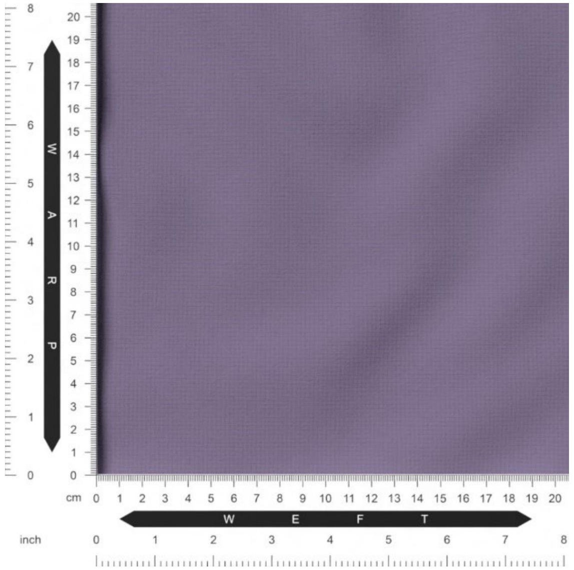
Style3D

Step 2: Surface imaging

Invest in 3D equipment

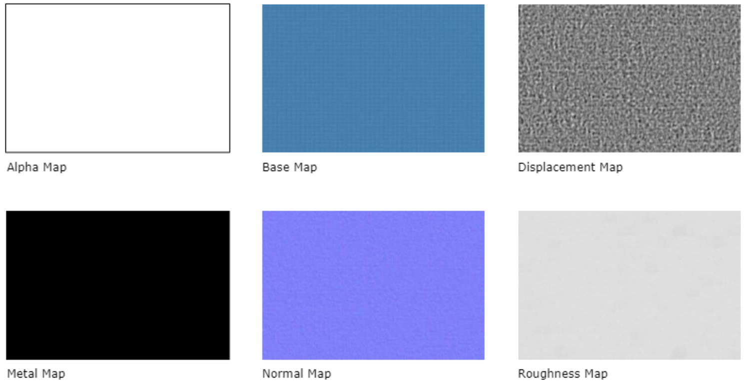




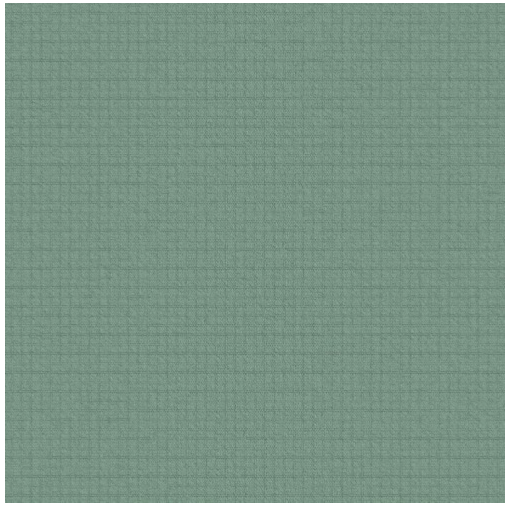


Texture Maps

From xTex Scanner



- Alpha Map – the amount of transparency/translucency of areas
- Displacement Map – uses a displacement of points (mesh) on the textured surface to create a depth and relief effect
- Metal Map – define if your material (or part of it) is bare metal
- Normal Map – fakes the way light interacts with the surface of material to fake smaller bumps and dents
- Roughness Map – how light is scattered across the surface of your model



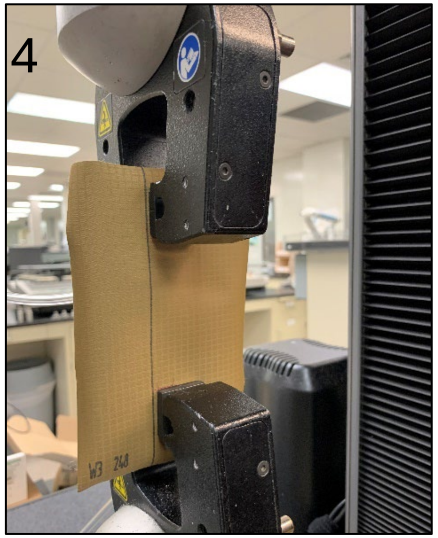
Step 3: Physical testing

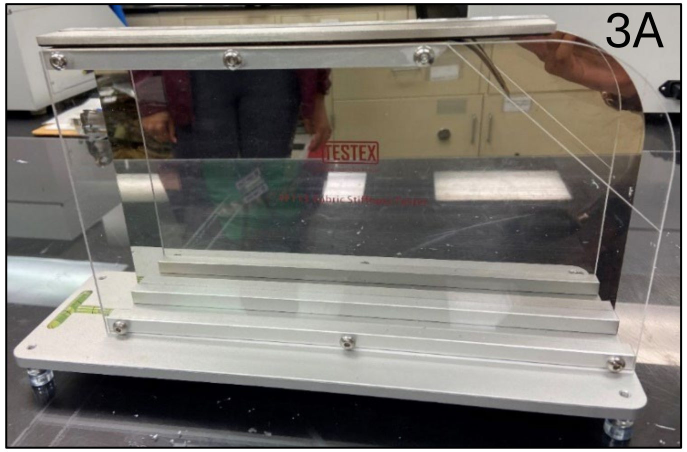
1) Weight
ASTM D3776

2) Thickness
ASTM D1777

3) Bending (Flexural Rigidity)
A. ASTM D1388-18
B. Kawabata KES-FB2-A
- Warp / Fill / Shear

4) Stretch (Elongation-Force)
ASTM D5034
- Warp / Fill / Shear





Invest in 3D equipment

Step 3: Physical testing

FAB Analyzer

Test once, convert to multiple 3D software

3D Retail Coalition subcommittee on digital material interoperability

3D·RC
3D Retail Coalition

Elongation Needs by Software						
	Style 3D	**Browzwear (*)**	**Assyst/Vidya**	**Gerber**	**Optitex**	**CLO 3D**
Number and Size of Specimen	3 per direction; Determine medium value per direction. 25cm x 5cm. Precise cutting recommended, use rotary cutter, Fraying not necessary.					While CLO specimen size is CLO 220mm x 30mm, it is OK to use standard specimen size 25cm x 5cm for classical testing equipment.
Machine Settings	Gauge length: 200mm Testing rate: 10mm/s Clamps: metal clamps with 32mm minimum width Maximum applied load: 18N Number of cycles: one	Gauge length: 200 mm Testing rate: 100 mm/min a CRE testing machine Pretention: none Clamps: rubber clamps with 50 mm minimum width Load cells: smallest possible e.g. 120N (for Instron machines, load cell can be 500N when accuracy is 0.5%) Maximum applied load: 25 N for non-stretch wovens, 12 N for knit or stretch woven fabrics. Can be up to 250N for composites or non-elastic materials, such as leather. Number of cycles: one				Load cells: smallest possible e.g. 120 N (for Instron machines, load cell can be 500N when accuracy is 0.5%)
Output/Unit	$K = \frac{F \cdot l_o}{\Delta l \cdot w} =$ K[N/m] F = force [N] w = specimen width (5 cm) l_o = initial length/clamp distance (8cm) Δl = extension[cm] corresponding to Force F [N]		Elongation [%] at 1 N/5 cm = 20 N/m 2 N/5 cm = 40 N/m	Stretch (cm/g) = $\frac{\Delta L\ (\text{cm})}{500\text{gf}} * \frac{L_o\ (\text{cm})}{\text{Sample width(cm)}}$ L = length [cm] corresponding to Force 500gf Gerber requires a 3" width (7.62cm) x 7" length (17.78cm) sample. If we test using the recommended 5cm width x 20cm length sample, the "Stretch" value is the elongation (cm) at the force of 328gf. (500gf/7.62cm * 5cm = 328gf) Stretch (cm/g) = $\frac{\Delta L\ (\text{cm})}{328\text{gf}} * \frac{20\ (\text{cm})}{5\ (\text{cm})}$	Young's modulus = $Slope = \frac{Rise}{Run}$ Young's modulus (E), can be calculated by dividing the stress (σ) by extensional strain (ε): $E = \frac{\sigma}{\varepsilon} = \frac{F/W}{\Delta L/L_o} = \frac{F \cdot L_o}{W \cdot \Delta L} = \frac{F \cdot L_o}{W(L - L_o)}$ F = force [1N = 101.97grf = 0.101kgf] W = specimen width (5 cm) L_o = clamp distance at the start of the test = **20cm** L = length [cm] corresponding to Force F [N] Attention: force must not reach area where plastic deformation of fabric starts Both Stretch and Shear properties are measured using grf/cm units. Properties are defined within the range of 10-100,000 grf/cm. The lower value represents almost ideal stretchable fabric; the upper limit represents completely non-stretchable, rigid material.	(**) CLO NOTE: Read the kgf/5 cm for non-stretch woven fabrics at: 2mm, 4mm, 6mm, 8mm, 10mm Or for knits or stretch woven fabrics at: 10mm, 20mm, 30mm, 40mm, 50mm (*) for composites or materials with very low elasticity: Max applied load may need to increase. Take force measurements at: 2mm, 3mm, 4mm, 5mm, 6mm (optional)
Testing Direction	Warp, Weft, Bias					
Final Output/Calculation	Not necessary Note: (*) see Appendix	Not necessary				Recalculate on a strip width 3cm → kgf/3cm

(**) CLO Note: if the fabric has a very low elasticity, it might not be possible to measure the elongation at 10 mm. In this case the data at 2, 4, 6 and 8 mm is sufficient.

Outsource 3D creation

1 – 3 yards

Average measuring time: approximately 30 mins per fabric.

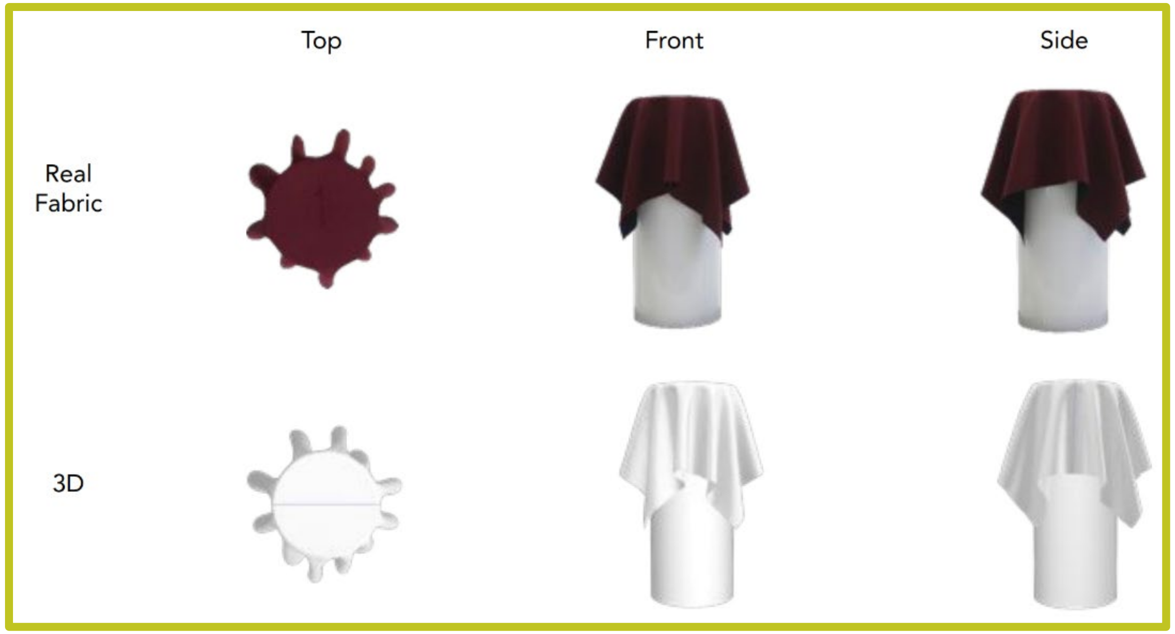
Measure Weight

Measure Thickness

Measure Fabric Stiffness

Measure Stretch

Optional Extra: Drape Validation



.zfab

.u3ma

Outsource 3D creation: AI

Input:

- Textile Construction
- Yarn Size
- Weight
- Fiber composition

Output:

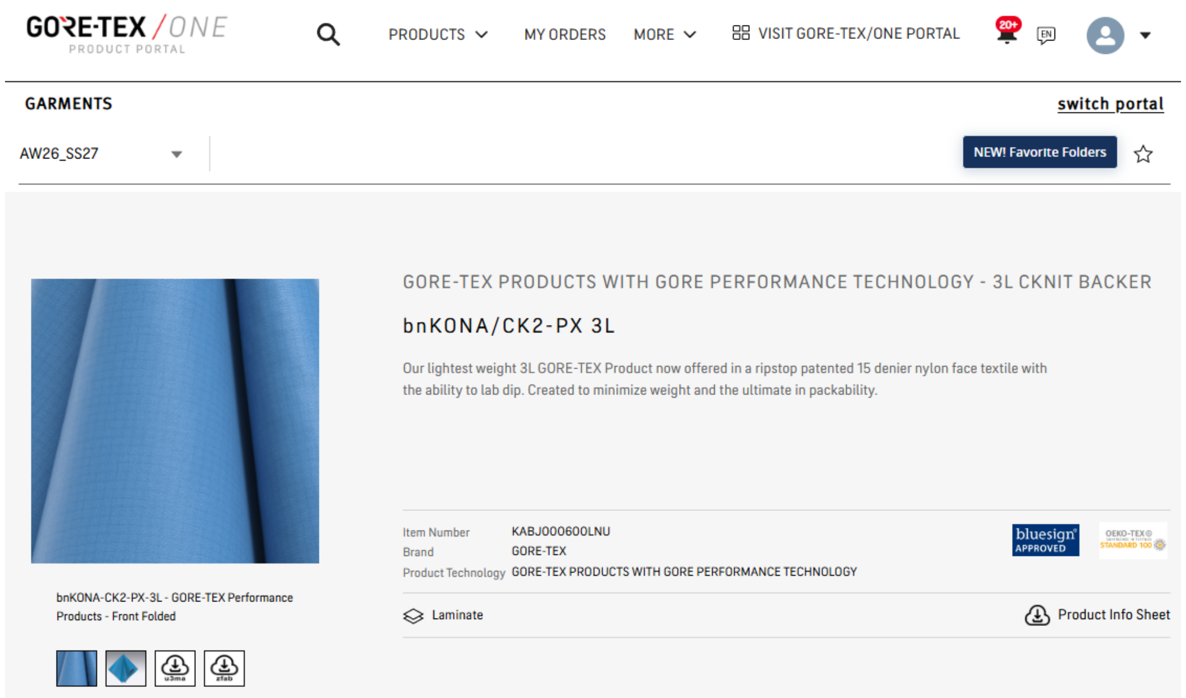
- Predicted physics
- Predicted surface images

Limitations:

- Single layer textiles
- Front side only
- New fibers, new yarns?
- Machine Learning AI

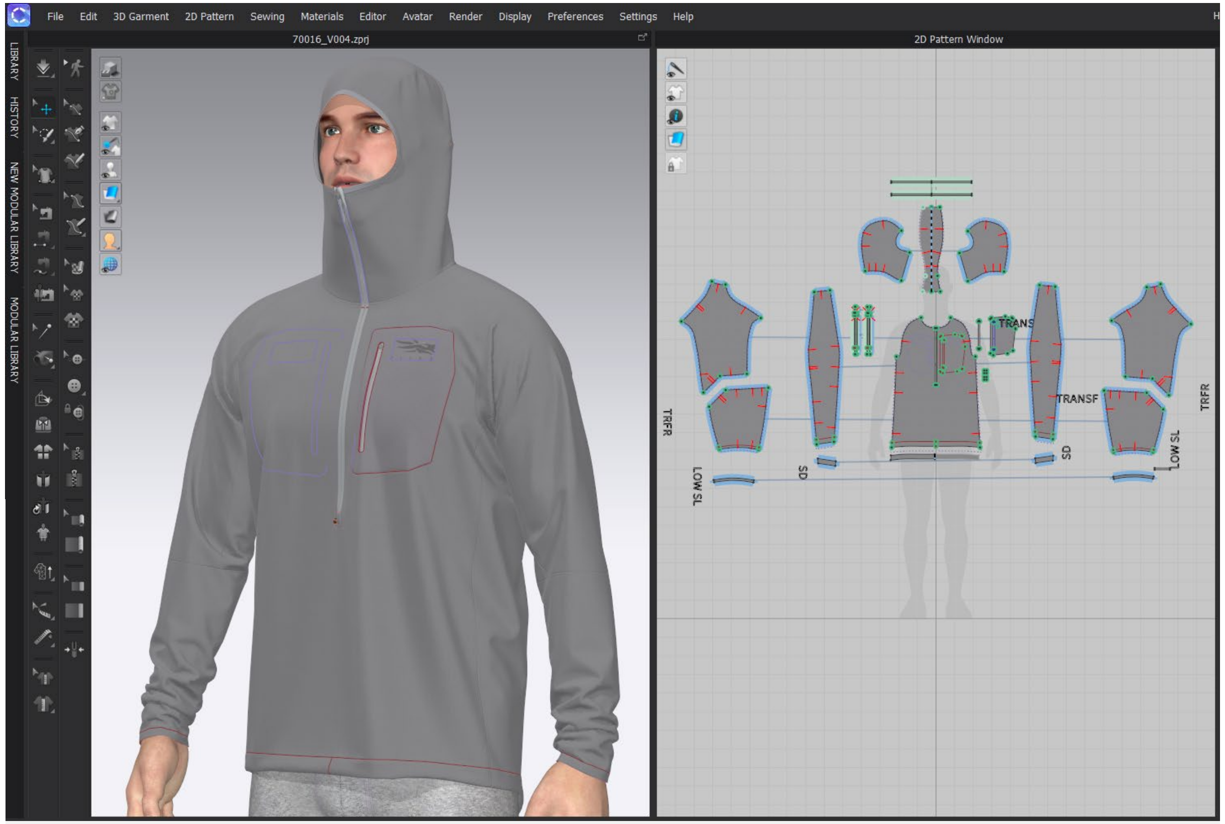
Generate content

- Digital Collection Lookbook
- Website



Generate content

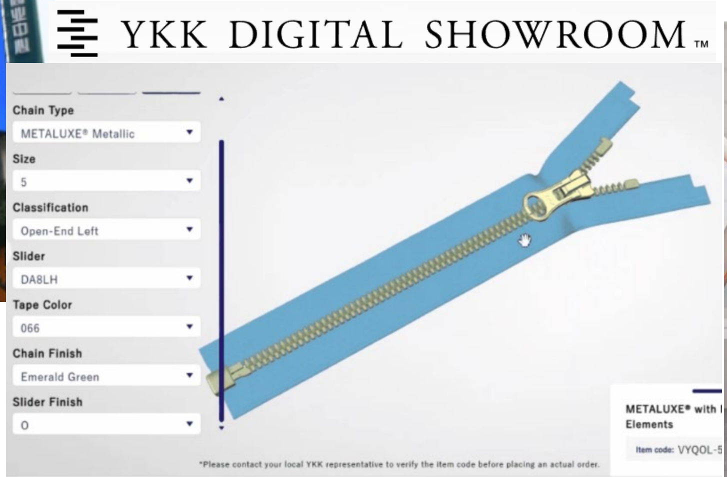
- Garment designs

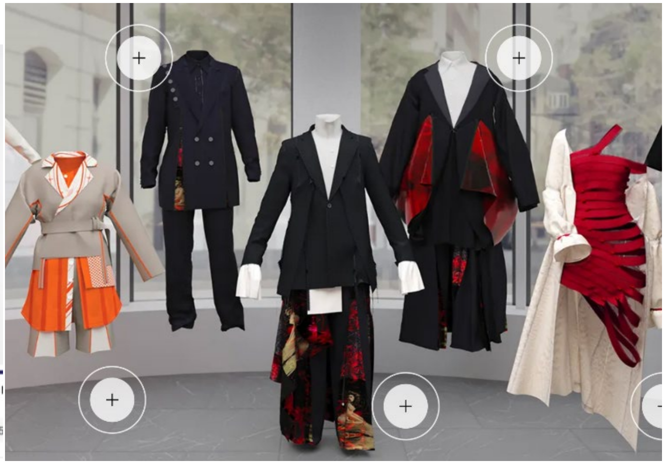


Promote to customers

- Annual Go-to-Market
- Teams / Zoom meetings
- Trade Shows / video signage

- Virtual Showrooms





Thank you

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AATCC President 2025-26

Creative Technologies Worldwide