

Digitizing Materials for Realistic 3D Simulation

How to measure and test fabric parameters
for 3D simulation of apparel



3D simulation improves ***efficiency***,
conserves ***resources*** and
lowers ***footprint***.

Bringing a Simulation to Life

Basic Requirements



1. Pattern



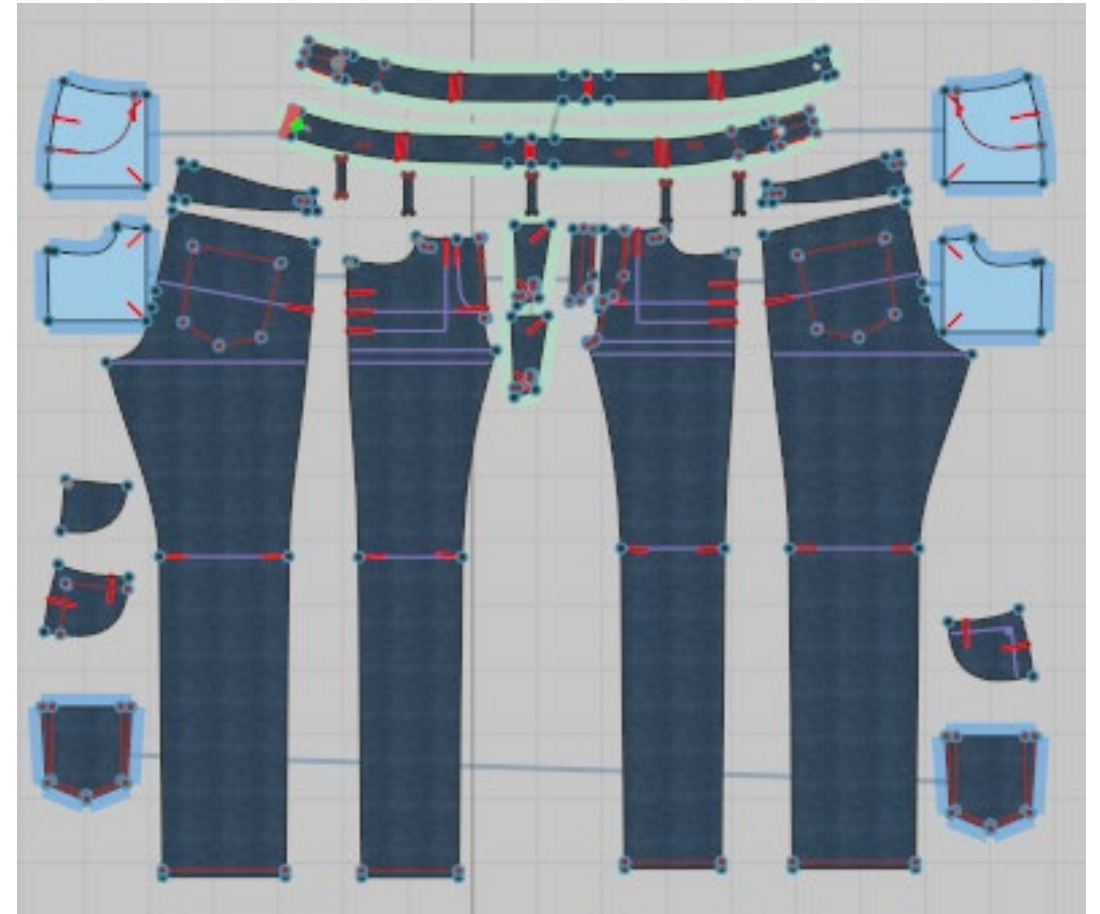
2. Avatars



3. Materials

1. Patterns

- Basic block
- Model pattern
- Grading



2. Avatars

- System avatars
- Fit dummies
- Scanatars
- Individual avatars



Hohenstein Avatars

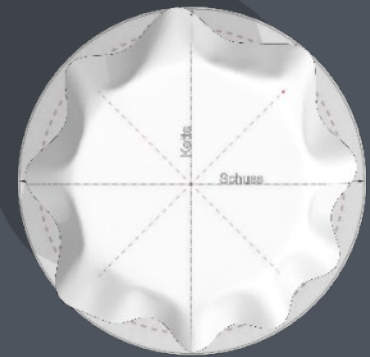
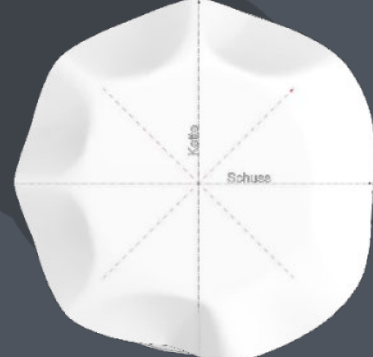
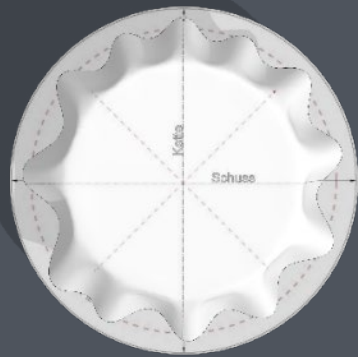
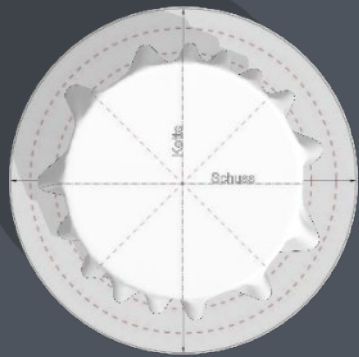
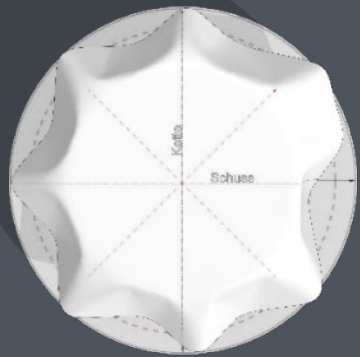
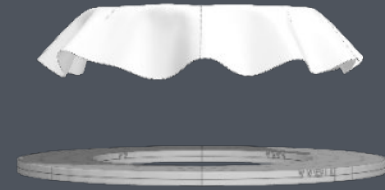
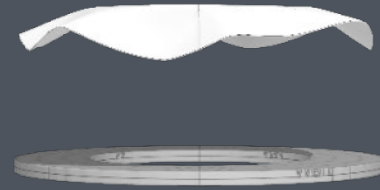
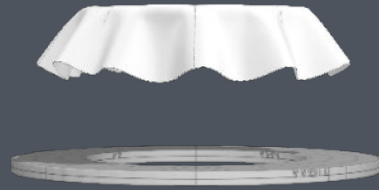
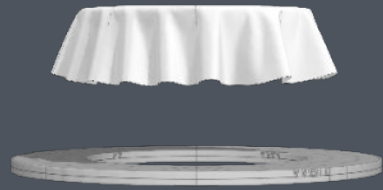
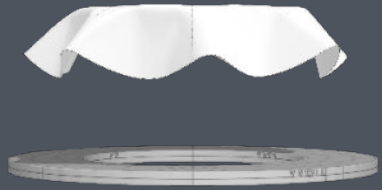


3. *Fabric Parameters*

- Essential for drape simulation
- Textile-physical material parameters/draping
- Texture/optics



Material
parameters
impact
virtual fit.



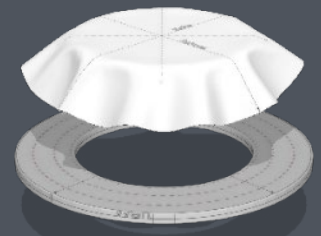
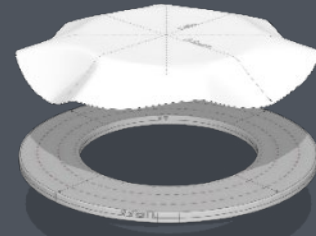
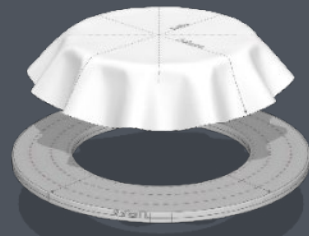
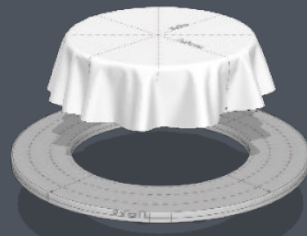
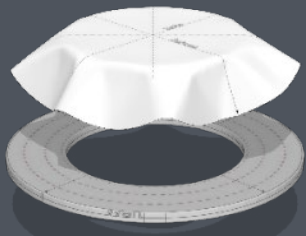
Canvas

Jersey 1

Leather

Protection

Jersey 2





Canvas

Jersey 1

Leather

Protection

Jersey 2



Go from idea to sale ***faster***
with ***efficient & effective***
3D design & visualization.

Simulation Workflow

Simulation



Sketch

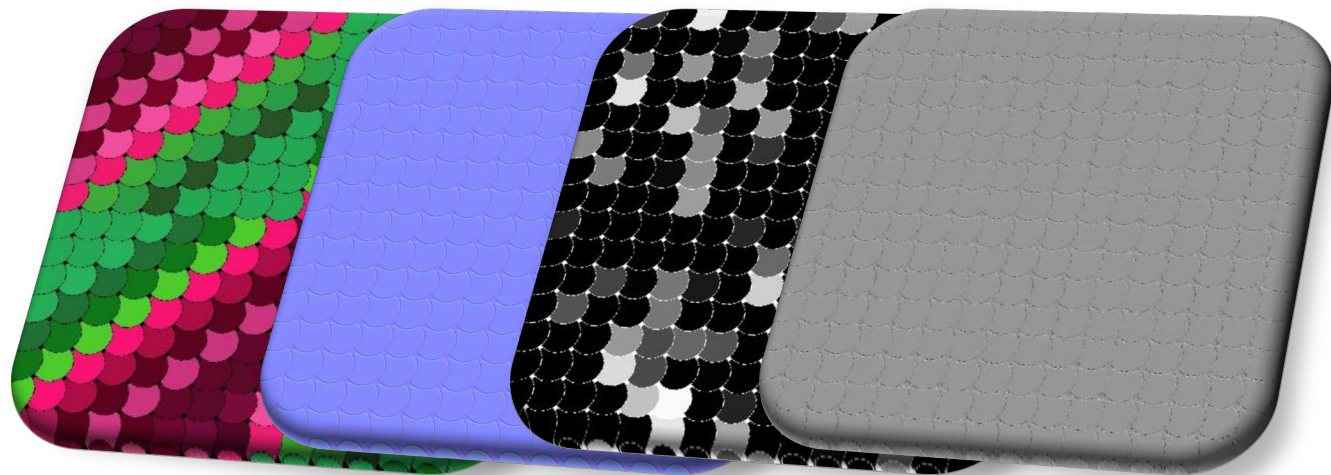


Prototype



Texture Maps

PBR - Physics-Based Rendering



Color

Normal

Roughness

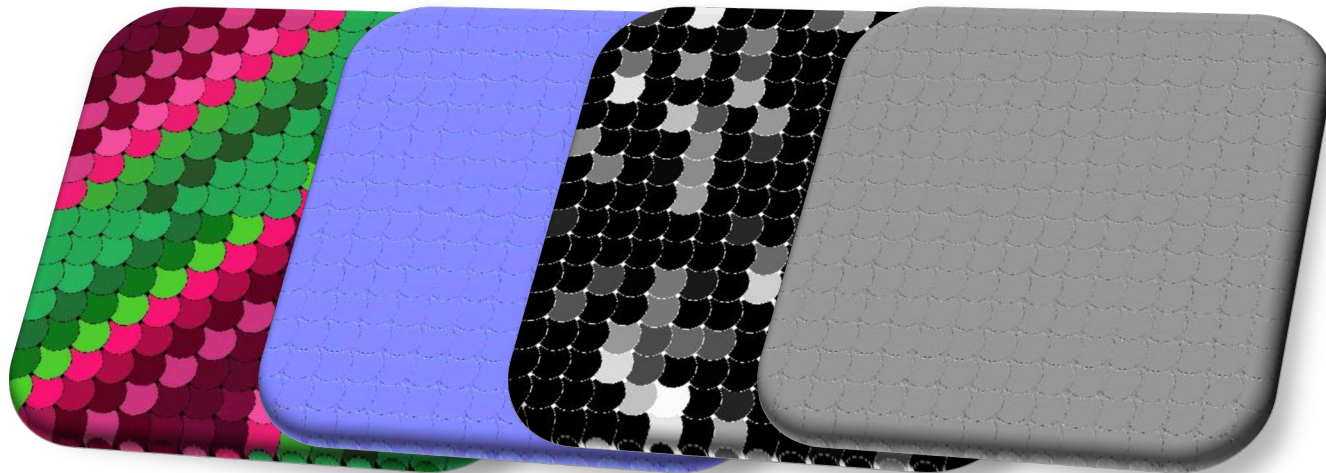
Height



Texture Maps

Photo-Realistic Simulation

PBR - Physics-Based Rendering

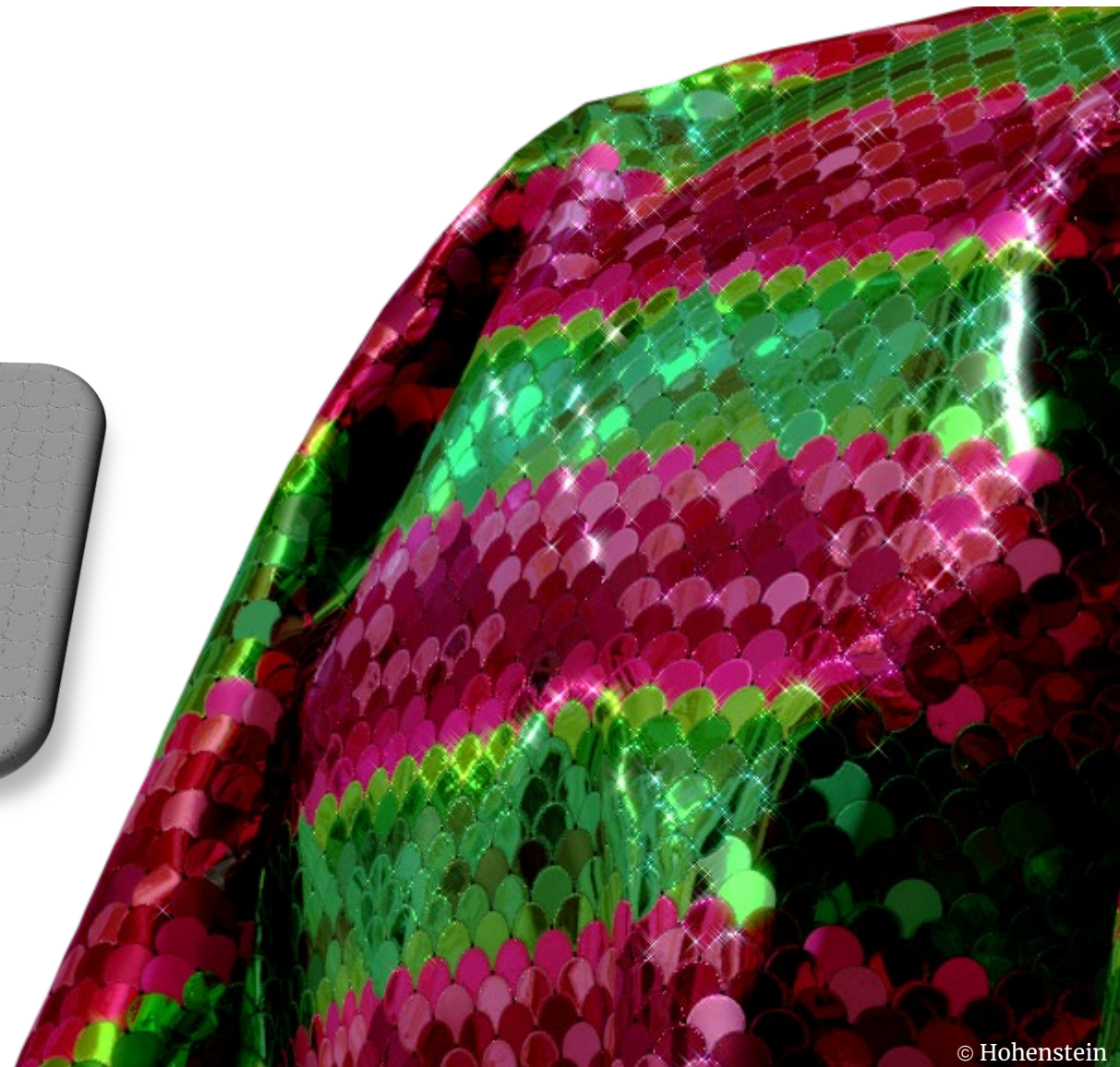


Color

Normal

Roughness

Height



The *Challenge*

Required Material Parameters

Challenge: Each 3D System requires its own parameters

Vidya Assyst

- Dehnungsstärke (N/m)
- Dehnung (%)
- Max. Dehnung (%)
- Komprimierung (%)
- Biegefestigkeit (μNm)
- Biegesteifheit (Faktor 0-1)
- Kompression diagonal (%)
- Elastizität (linear) (N/m)
- Elastizität (quadratisch) (N/m)
- Reibung (Faktor 0-2)
- Gewicht (g/m^2)
- Stoffdicke (mm)
- Spannungsdämpfung (Ns/m)
- Biegedämpfung (Ns/m)
- Faltenvolumen (0,01-1)
- Faltenform (0-100)

Browzwear V-Stitcher

- Mass ($\frac{\text{g}}{\text{m}^2}$)
- Friction
- Thickness (mm)
- Bend – W/L ($\frac{\text{dyn}}{\text{cm}^2}$)
- Stretch- W/L ($\frac{\text{N}}{\text{m}}$)
- Stretch Linearity – W/L (%)
- Shear- W/L ($\frac{\text{N}}{\text{m}}$)
- Shear Linearity (%)
- Shrink- W/L (%)

3D CLO

- Friction coefficient
- Thickness, Dicke (mm)
- Bending weft/warp ($((\text{g} \cdot \text{mm}^2)/(\text{s}^2 \cdot \text{rad}))$)
- Stretch weft/warp (g/s^2)
- Shear (g/s^2)
- Shrinkage weft/warp (%)
- Buckling Ration weft/warp
- Density (g/m^2)
- Internal Damping

There is NO Testing Standard Yet

Different:

- Test devices
- Sample sizes
- Test specifications

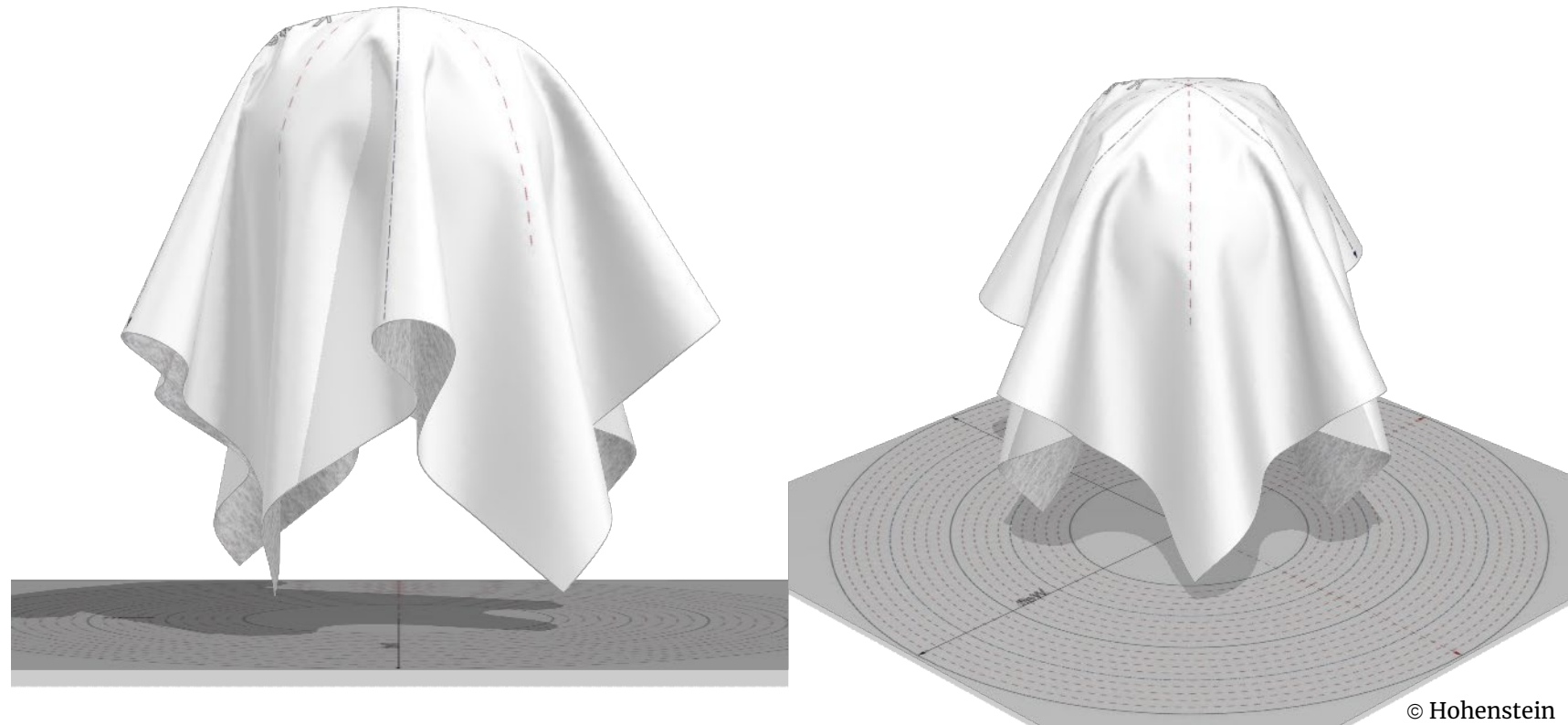
We are working on standards



5 Most Important Parameters

We digitize your fabrics - for all 3D systems

- Weight
- Thickness
- Bending
- Elongation
- Fold volume & shape



Material Testing Approaches

- Manual testing - without professional testing equipment
- Software material kits - results are linked to a single software
- Professional labs (e.g. Hohenstein)

Lab testing advantages:

- Reproducible results - known standards
- Reliable results even for complex fabrics
- Data universal for all 3D systems



Hohenstein Testing Process

Textile-physical Testing

- Weight
- Thickness
- Bending
- Elongation
- Fold volume & shape

Scanning/creating of texture

Test Result Processing

- Convert the units
- Create individual file formats
- Generate draping images

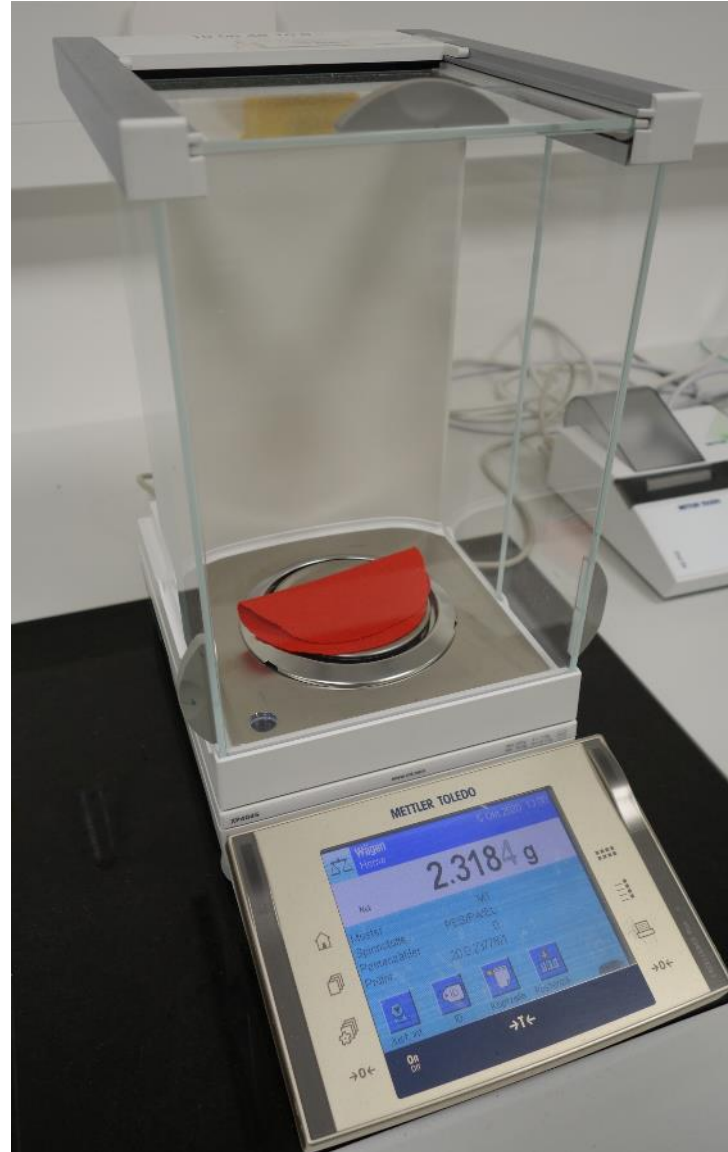


Data Format Examples

- Vidya – .vdy
- Clo3D – .zfab
- Browzwear – .u3m

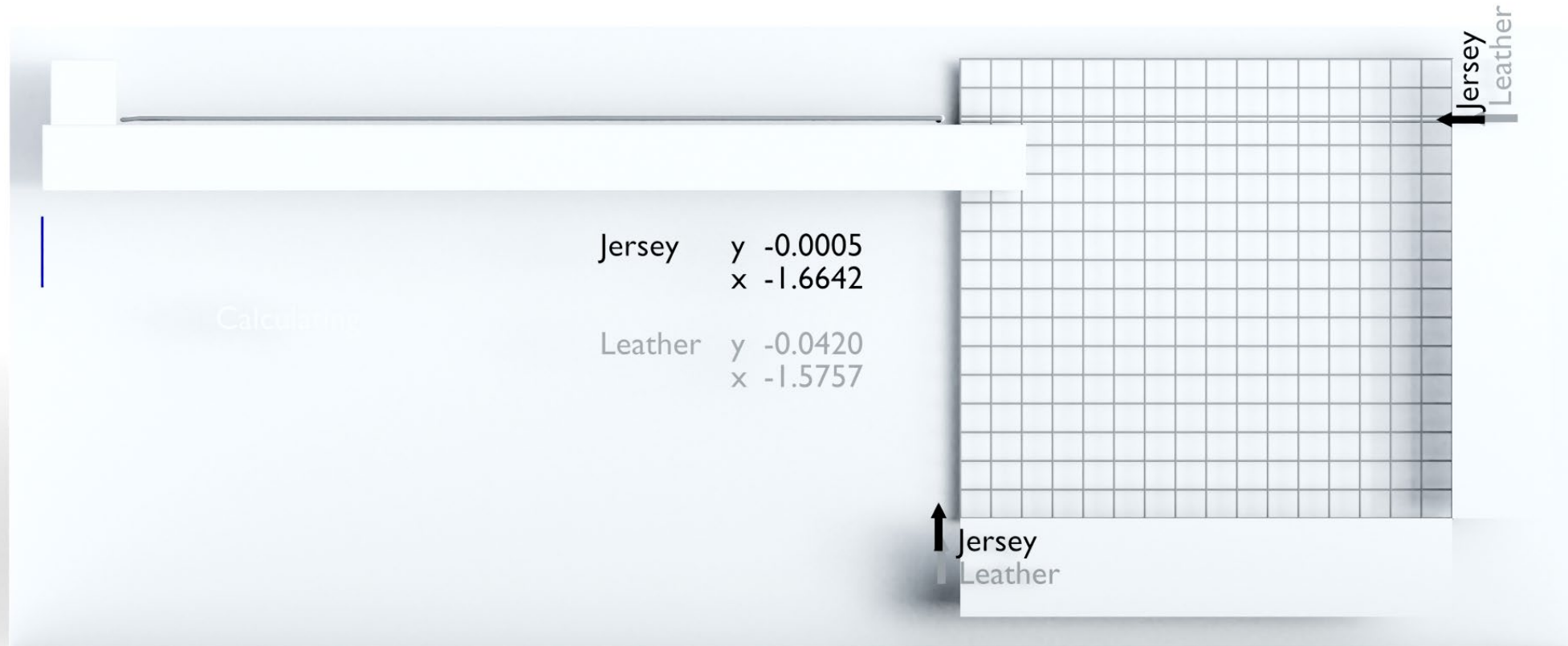
Weight
DIN EN 12172

Thickness
DIN EN ISO 5084



Bending – Cantilever Method

DIN 53362: 2003-10



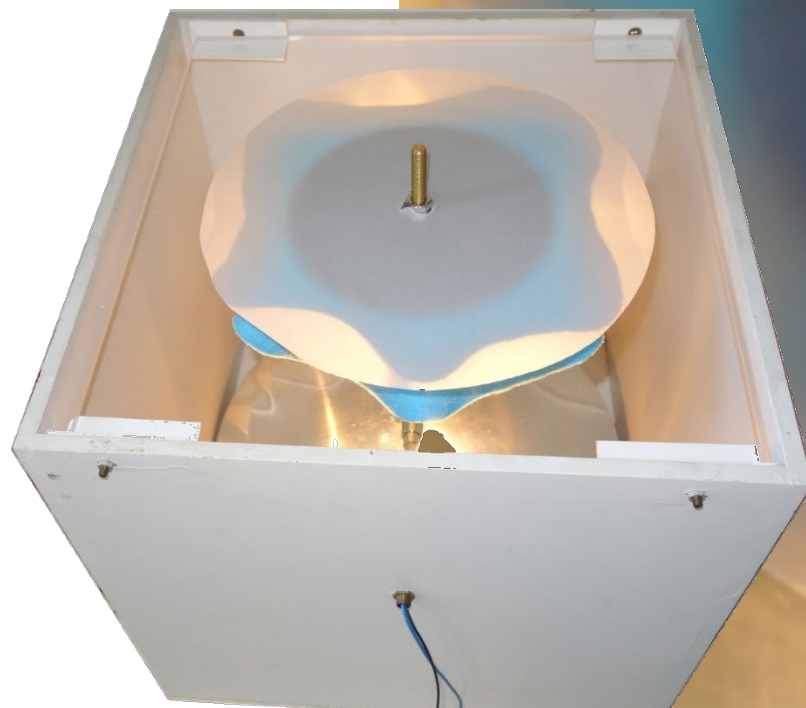
Elongation/Stretch

- DIN EN ISO 13934-1 or DIN 53835 T14
- Warp / weft / bias
- Elasticity



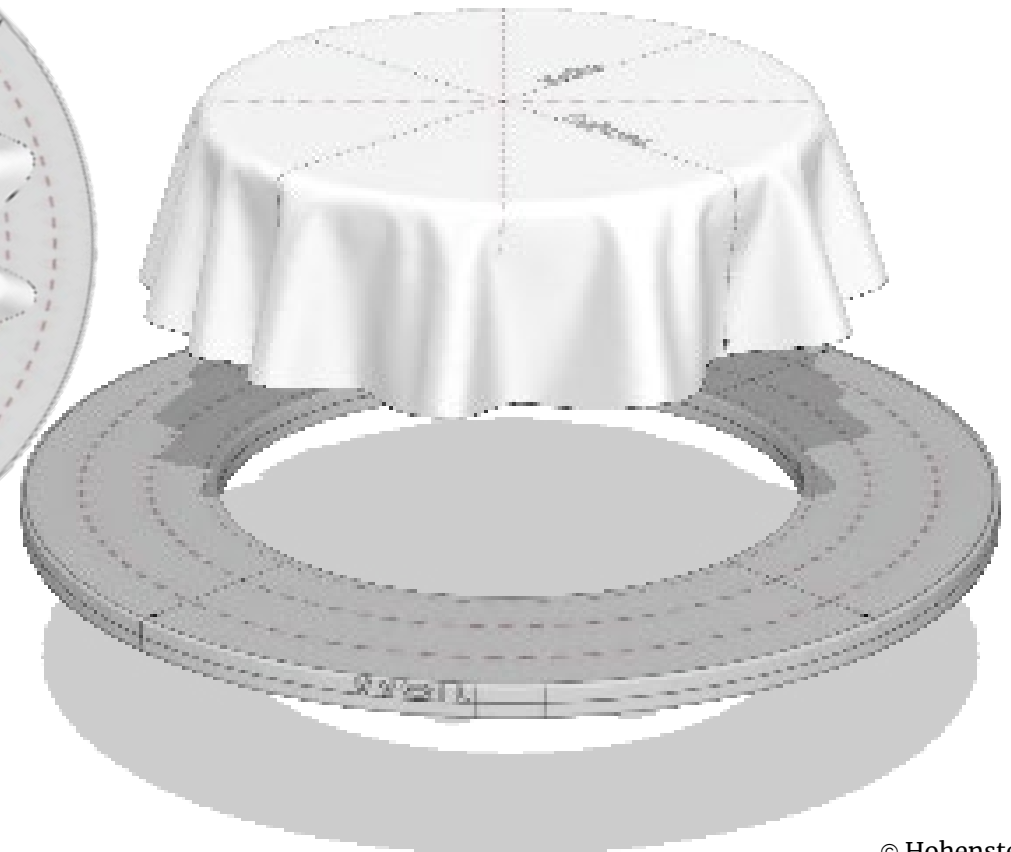
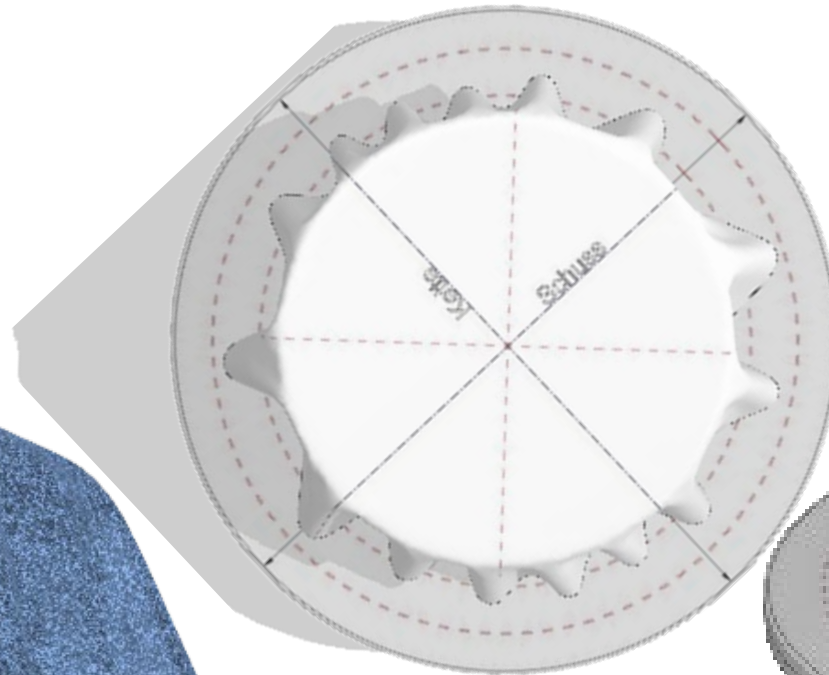
Fold Volume & Shape

- Drapemeter
- DIN EN ISO 9073-9:2008



Drapemeter Test Results

Draping images



Texture

Software:

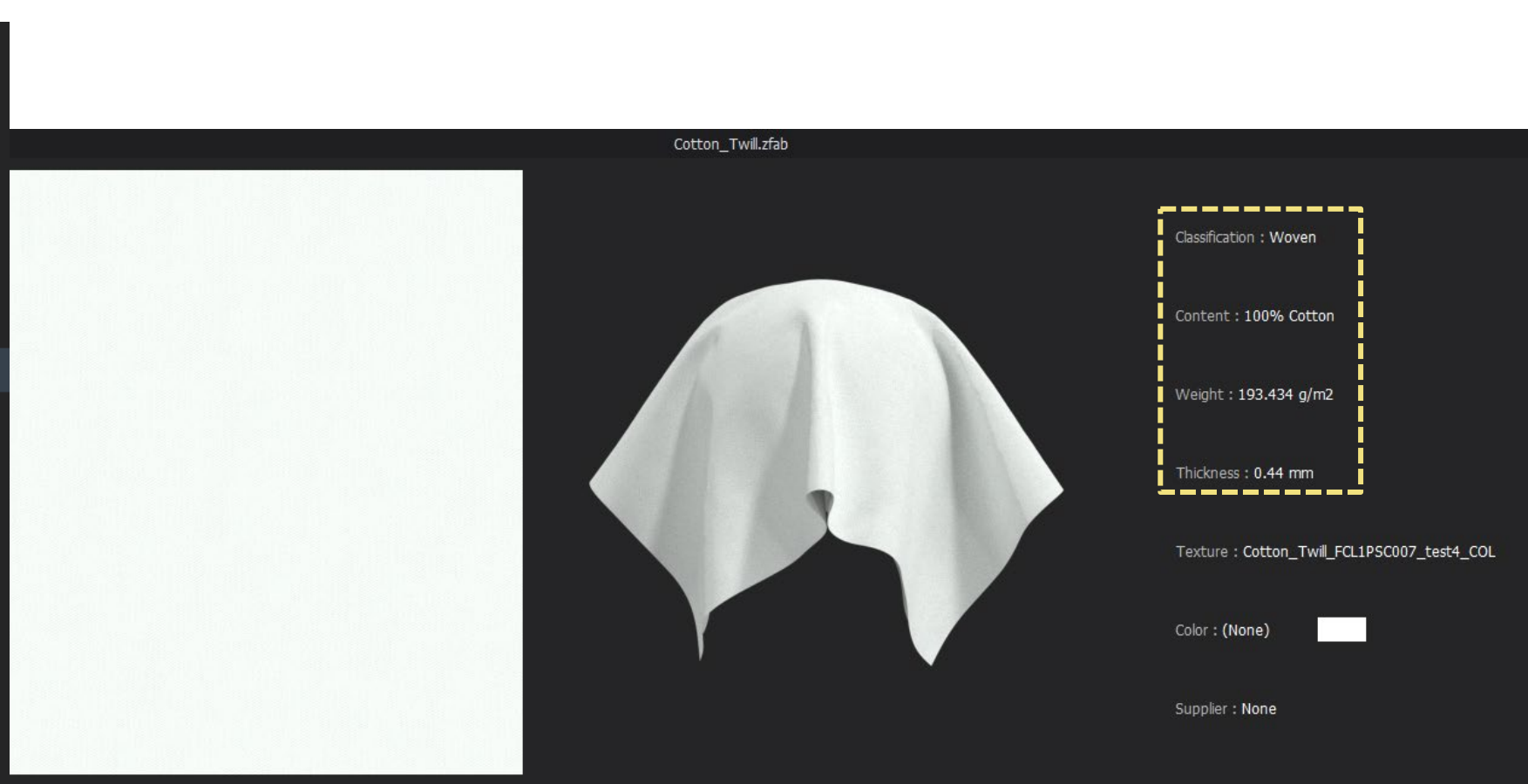
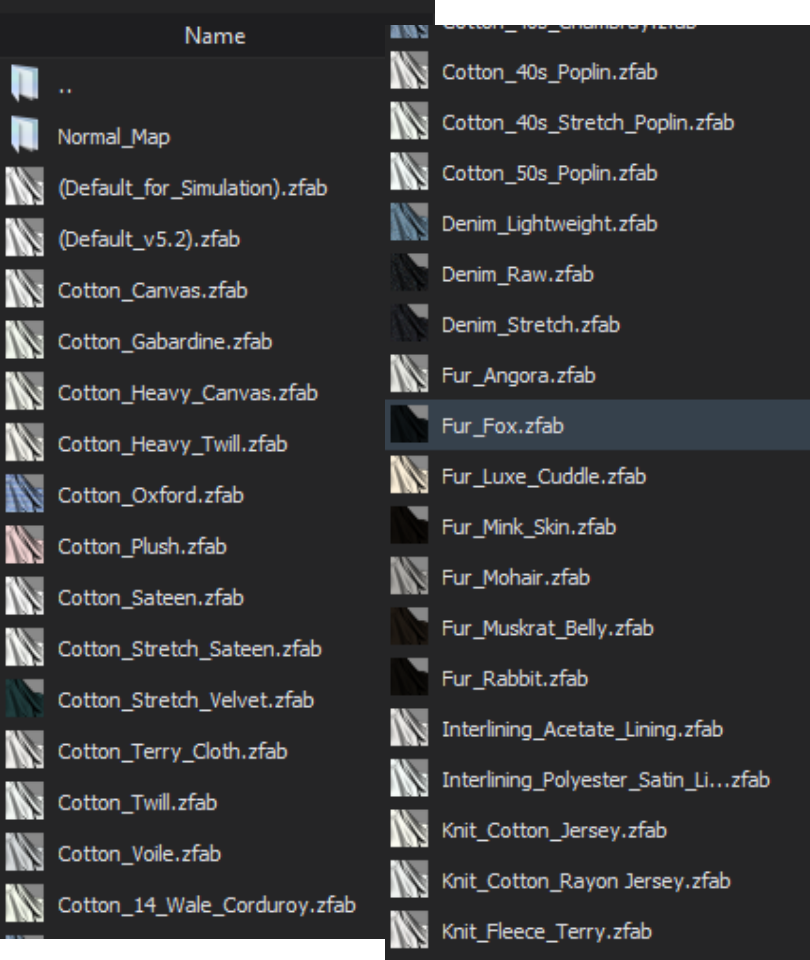
- Substance Designer
- Substance Alchemist
- X-Tex

Hardware:

- Texture scanner



The path to your own
material data library



Standard Material Libraries

Beginner - Not a Long-term Solution

Material Data Libraries

- Standard data in the software
- Material libraries to purchase
- Swatchbooks

Create your own material data library and your own Swatchbook

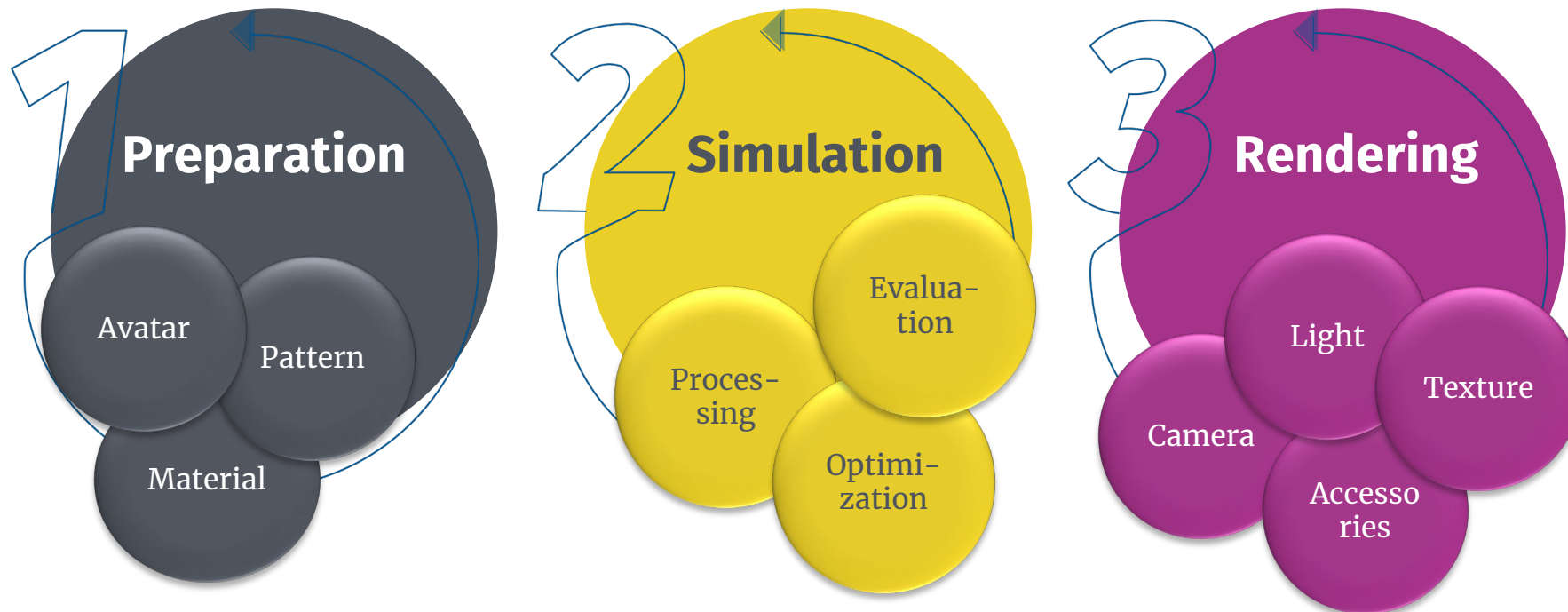
Issues with Standard Data

- Basics = unknown
- No match with specific fabrics used in your collection

Decide on
a **consistent** method.
Only then, you will obtain
reliable data.

Hohenstein 3D Services

Hohenstein supports digitization by combining textile expertise with 3D technologies.



Digital Fitting Lab

Modular services
for optimizing processes
& implementing
efficient 3D workflows



The Hohenstein Academy

- Free registration
- Access to topic overviews from experts who have done the research





Hohenstein Expertise

Comfort

Odor

Quality

Fit

Function

Washability

Safety & Sustainability



***Hohenstein Customer Support
1000+ Worldwide Employees***

Thank you

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