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Investigation of the tissue displacement through textile pressure on soft avatar Sofia in Browzwear's VStitcher software

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Clothing Body Interaction Conference
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AGENDA

01 Introduction
- CAD clothing fit simulation
- Textile Chain

02 Garment Development
- Tight-fitting and compressive garments
- Pressure maps rigid avatar

03 Soft Avatar
- Simulation possibilities
- Overview Soft Avatars

04 Soft Avatar Sofia
- Garment fitting
- Visual comparison

05 Evaluation
- Mesh and cross section comparison
- Circumferential dimensions

Introduction

Digital Process

Saving prototype production, revision and improvement - first try approach

Efficiency

Shortening development time and increasing efficiency

Sustain-ability

Digital development and editing makes the creation process more sustainable

Soft Avatar

Soft avatars are used in many different applications, now also for clothing simulation to visualize the impact of tight-fitting garments

Problem definition

Material Properties

In this way, the elasticity of the material can be taken into account and the actual influence of the garment on the body can be estimated

Rigid Avatar

Until now, patterns in digital development have been fitted to rigid avatars

Soft Avatar

Soft avatars allow to take into consideration the softness of the body during the development of the pattern

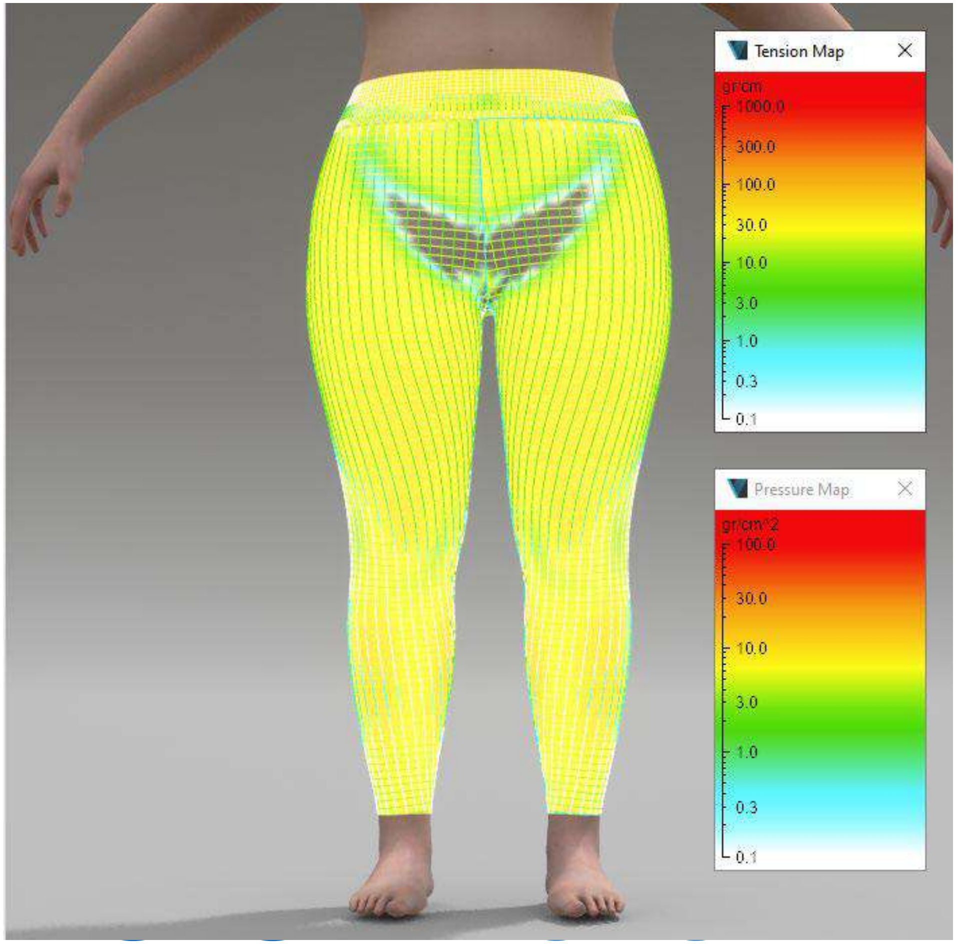
Soft tissue influence

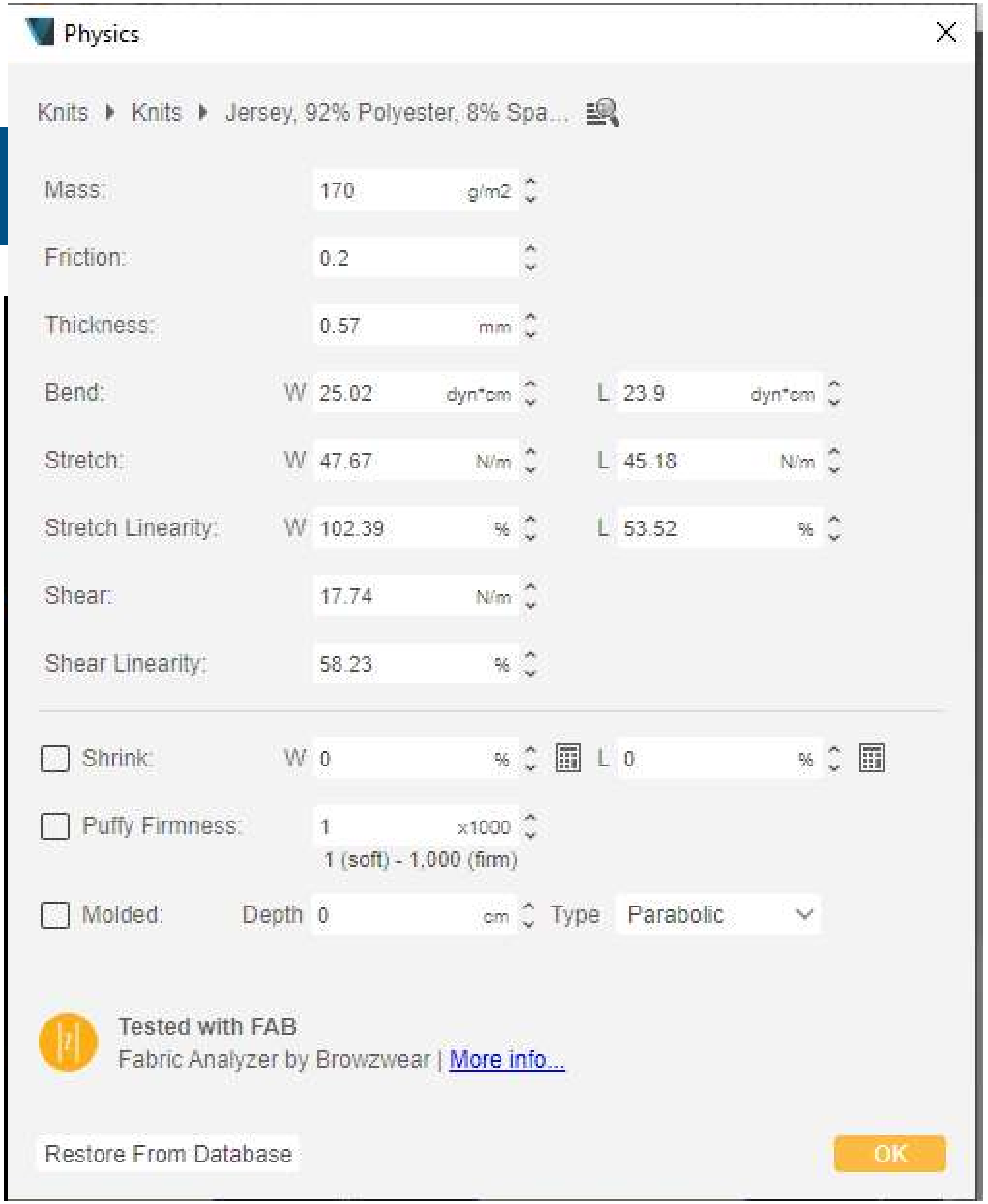
The more accurately the influence on the human body can be simulated, the more precisely the material and pattern can be selected and developed

Task:

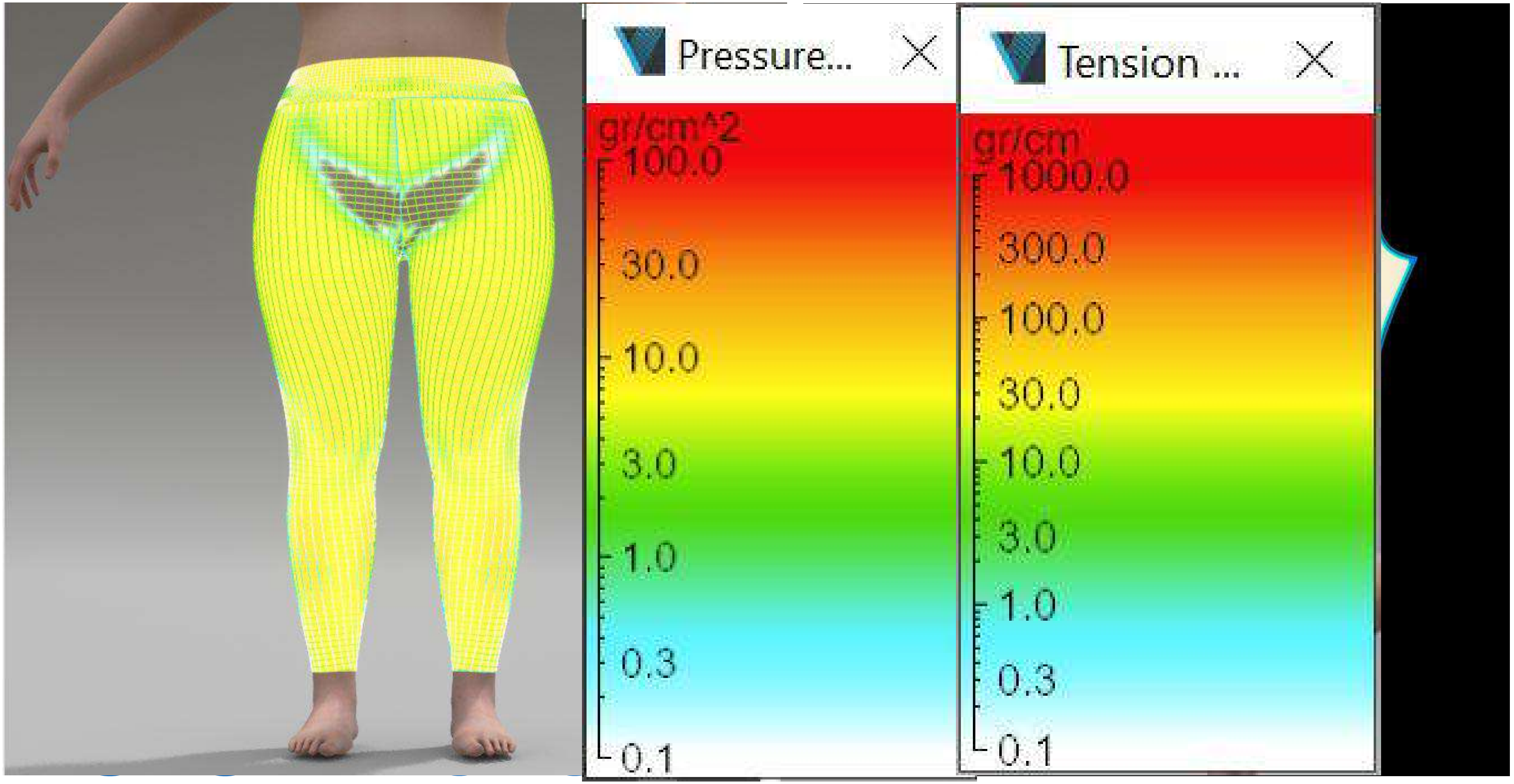
Examination of the changes in the natural shape of the avatar that will be affected by the pressure exerted from the textile

Garment Development





Garment Development



Measurement avatar Sofia and legging

Sofia without influence of the clothing compression [cm]		Pattern measurements [cm]		-10% ease [cm]	-30% ease [cm]	-50% ease [cm]
Waist	100,83	Waist band	65,00	58,50	45,50	32,50
		Waist line	68,40	61,56	47,88	34,20
Hip	127,07	Hip line	96,00	86,40	67,20	48,00
Thigh	71,83					
Knee	43,44	Knee line	59,90	53,91	41,93	29,95
Calf	41,94					
Ankle	24,85	Hem line	40,00	36,00	28,00	20,00

Garment Development

- 10%

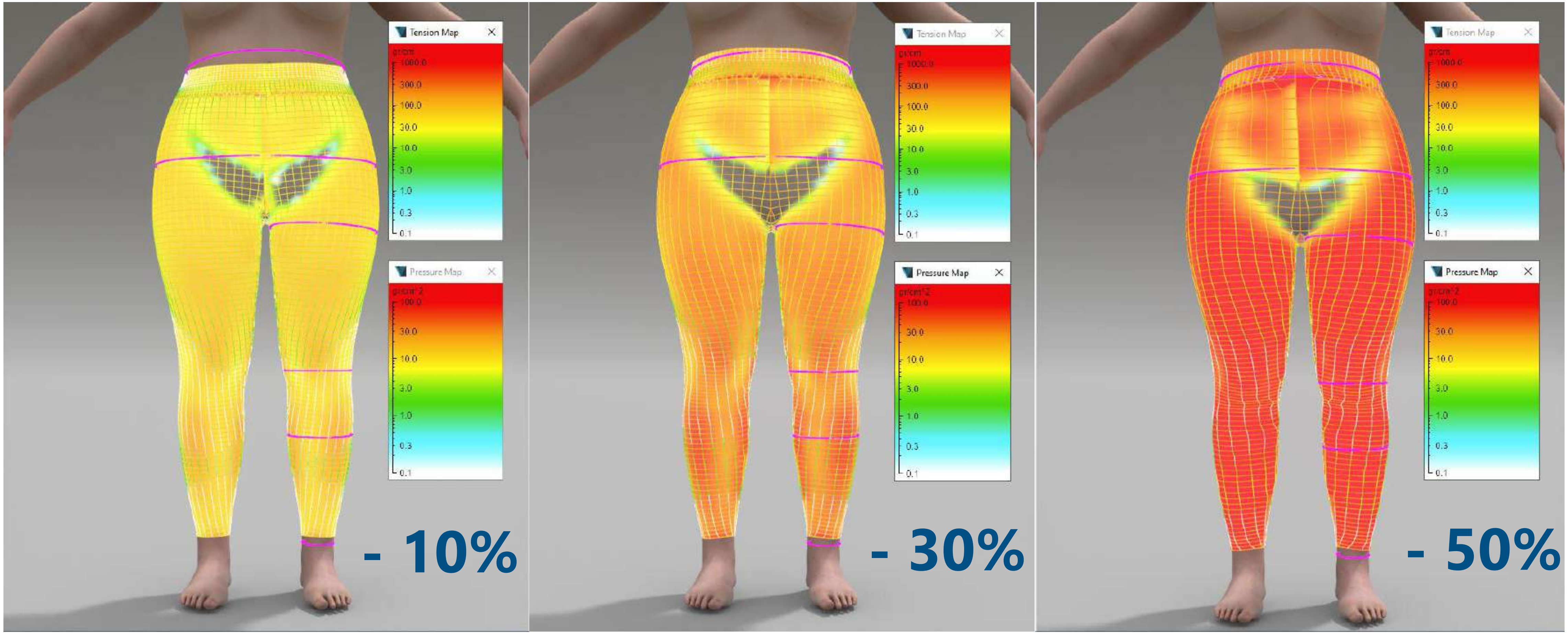
Garment Development

- 30%

Garment Development

- 50%

Compression maps rigid avatar



soft avatar overview

FEM: finite element method

a numerical method to calculate deformations of a structure under specific loads. Here, the structure such as a human's body muscle is divided into smaller, manageable parts which are called elements and through solving a set of equations according to the assumed material models the deformation of each element under different loads like pressure, gravity or motion is calculated.

MBD: multibody dynamics simulations

used to model the interactions and movements of several rigid bodies connected by joints and subject to external loads to simulate deformations of the human body under pressure and the interaction with other objects. Here, the force distribution, the physical deformation and the interactions with other objects are analysed.

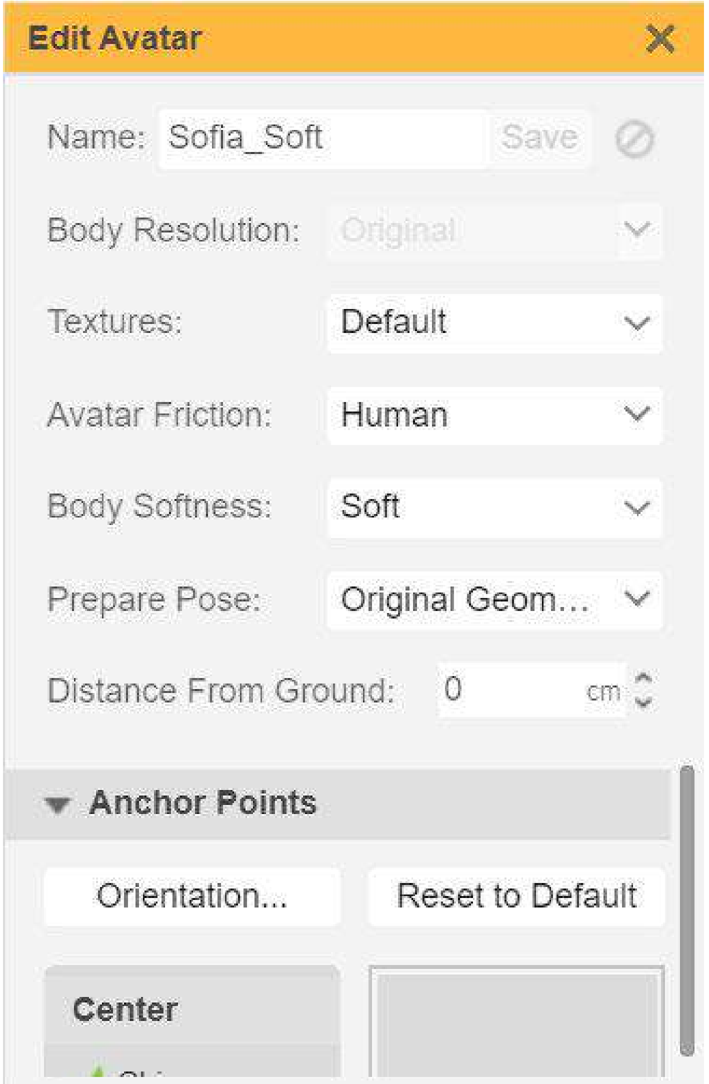
Soft tissue models

they capture the mechanical properties of individual human tissues for simulation and simulate the deformation of the tissue structures under different load cases. This method can be combined with FEA and MBD to increase the accuracy.

VStitcher soft avatars

	Olivia [cm]	Sofia [cm]	Oliver [cm]	Joseph [cm]
Height	173,2	167,7	181,1	182,2
Neck	35,8	40,1	40,9	46,9
Shoulders	37,8	40,7	44,8	53,8
Bust / Chest	88,9	118,4	101,5	124,5
Waist	68,9	101,0	86,0	116,5
Hip	95,2	127,3	99,5	122,5
Biceps	25,8	38,3	34,0	41,8
Thigh	55,4	72,1	57,3	69,9

VStitcher soft avatars



Soft avatar Sofia

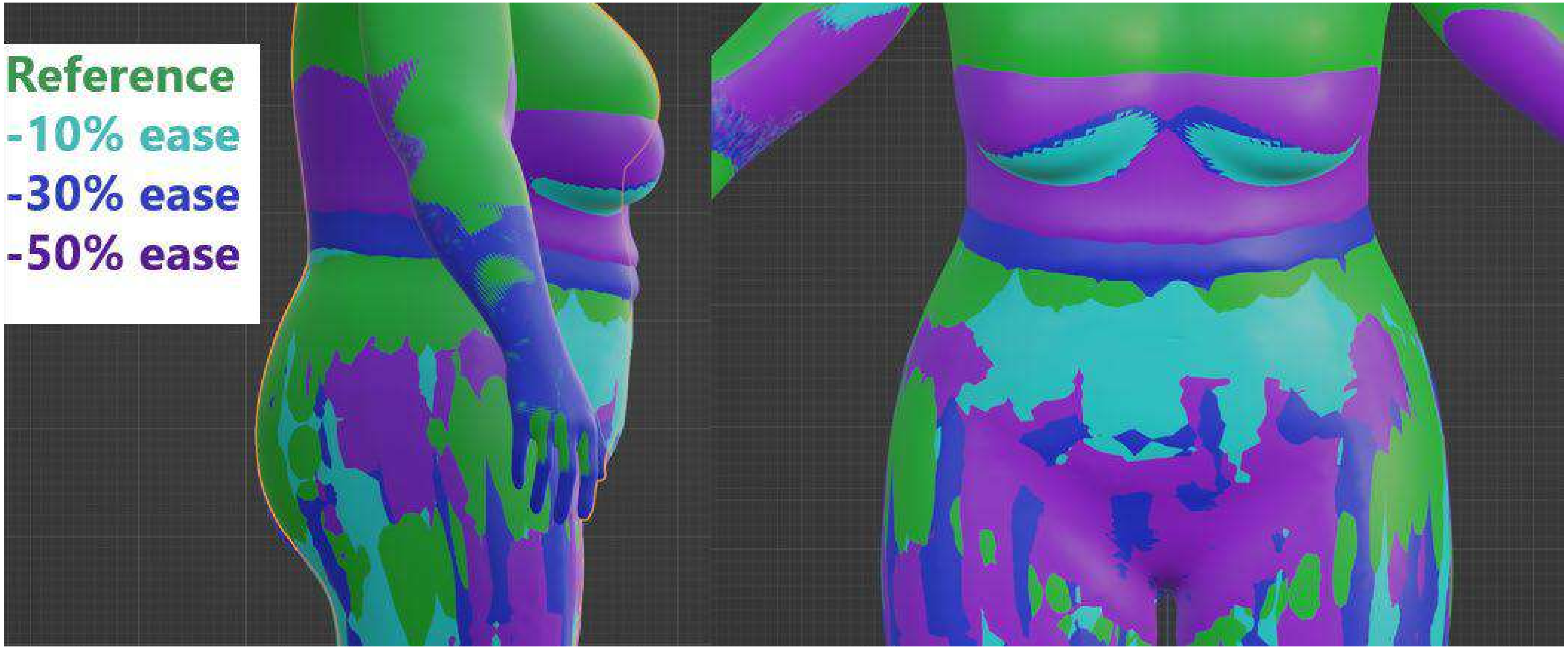
ease -50%

soft avatar **rigid avatar**

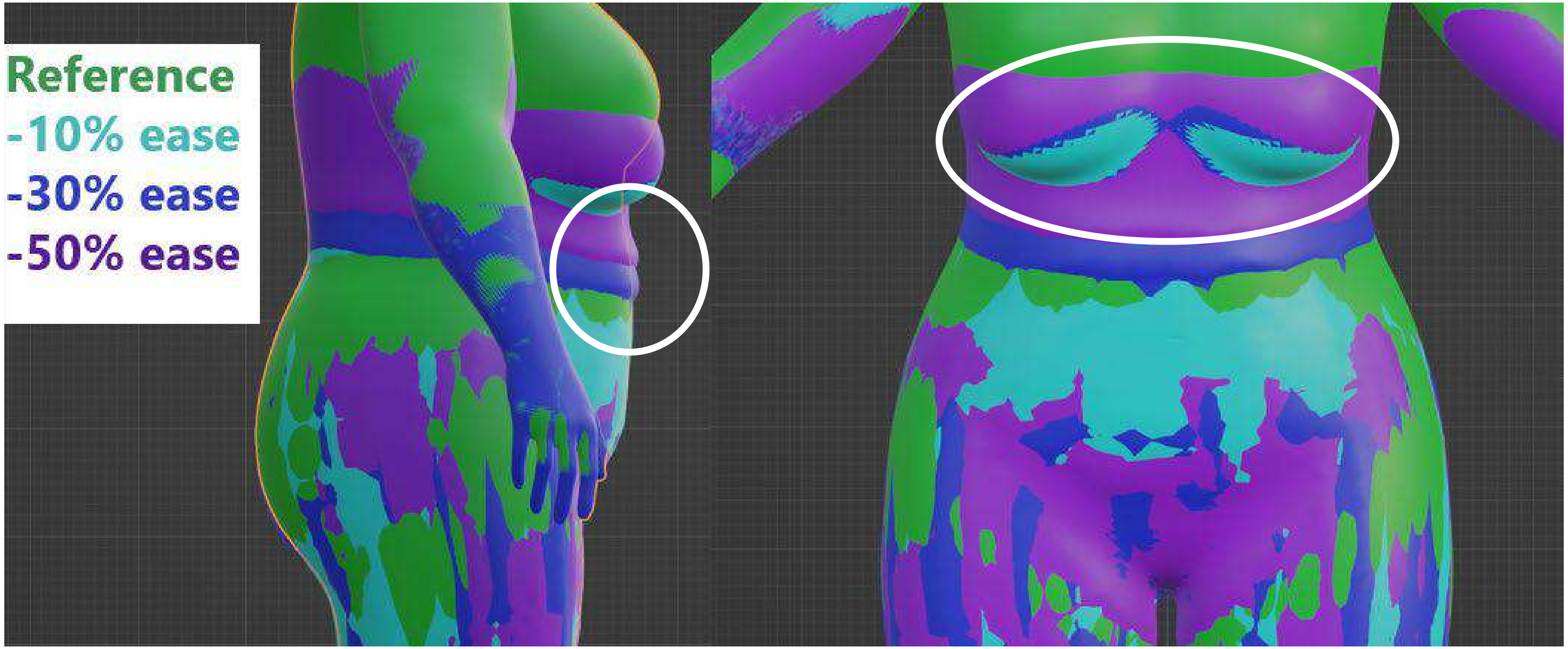
Evaluation circumferential dimensions

Sofia without influence of the clothing compression [cm]		-10% ease [cm]	-30% ease [cm]	-50% ease [cm]
Waist	100,83	101,94	102,73	100,81
Hip	127,07	127,03	127,05	126,99
Thigh	71,83	71,37	72,02	72,59
Knee	43,44	43,40	43,18	42,76
Calf	41,94	41,81	41,88	41,86
Ankle	24,85	24,91	24,88	24,91

Comparison of the resulting meshes

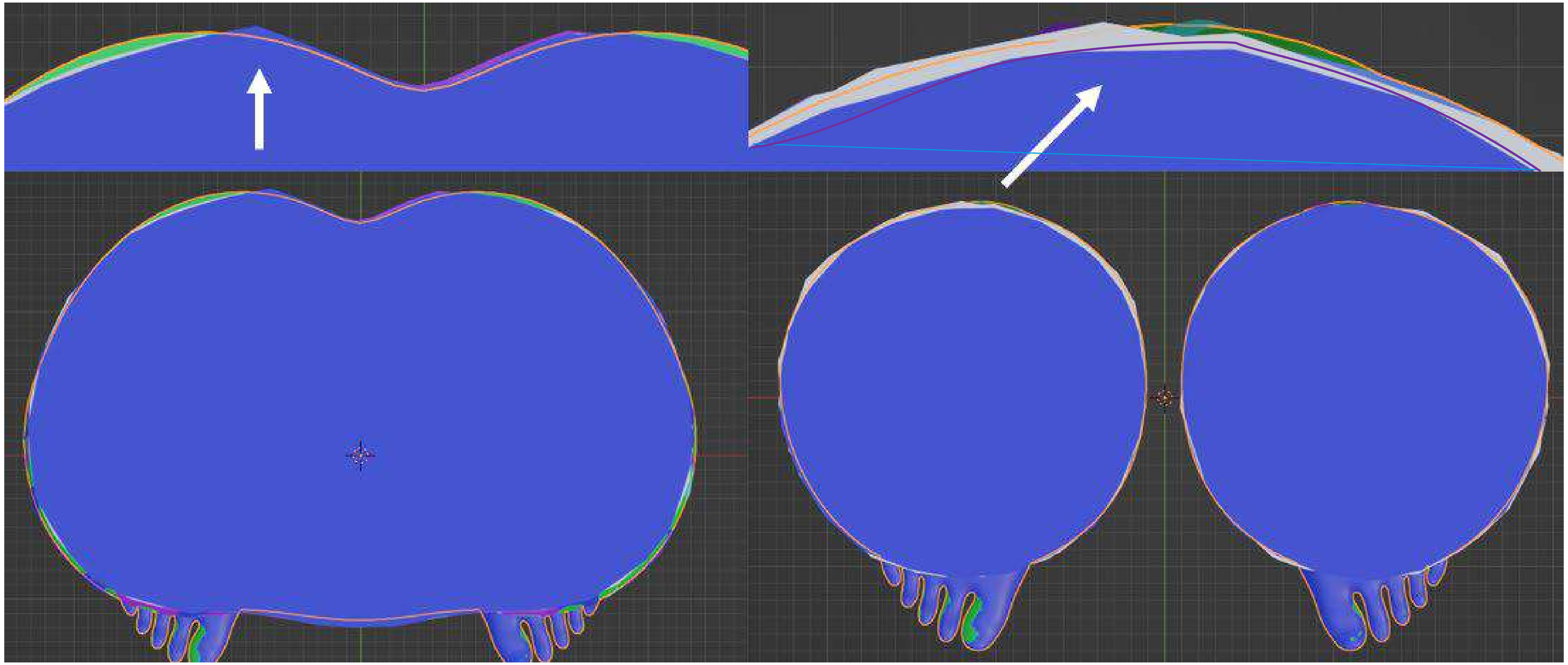


Comparison of the resulting meshes



- leggings cut into lipid zones
- breast is strongly affected by gravity

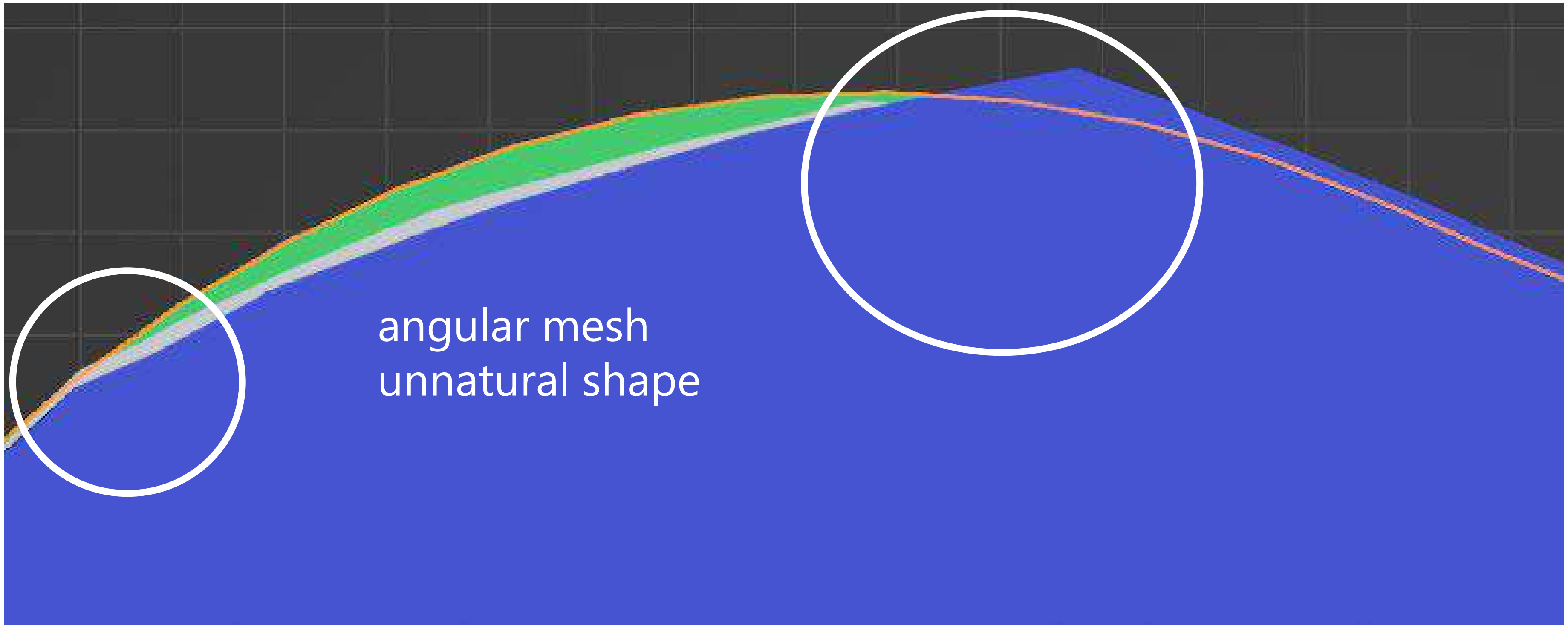
Comparison cross section



Reference
-10%
-30%
-50%

hip cross section **thigh cross section**

Comparison cross section



Reference
-10%
-30%
-50%

Conclusion

Analysis

Only a visual comparison was done and angular shape deformations could be observed

Due to lack of information about the properties of the avatar no other analysis could be performed to verify the deformations

Software

To investigate the accuracy, it would be important to identify the simulation method so that conclusions can be drawn about the underlying material model

Time-efficient simulation and fit verification prediction

Avatar

Adjusting the muscle and fat percentage of the avatar would be a great asset, as well as being able to adjust the body measurements

Thank you for your attention

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