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Clothing — Digital fittings — Vocabulary and terminology used for the virtual garment

Habillement — Essayage virtuel — Vocabulaire et terminologie utilisés pour les vêtements virtuels

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 133, *Clothing sizing systems — Size designation, size measurement methods and digital fittings*.

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Introduction

This International Standard deals with virtual garments for digital fitting.

Various types of virtual garment-based IT/fashion convergence technology are being attempted today, in response to the rapid development of the vast online fashion market, including the internet, smart phones, smart TVs, and virtual fittings at bricks-and-mortar stores. Meanwhile, the increased demand for ubiquitous fashion business services is encouraging efforts to innovate with regard to the traditional processes of planning, production and sales. The use of digital technology in the modern international apparel industry is leading to the use of three-dimensional information for fashion products. These products reflect appearance, design and texture characteristics of garments. It is envisaged that consumers will be able to go online anytime, anywhere, to try on clothes, evaluate the style and fit and place orders. Despite such advances, there is no International Standard related to virtual garments.

The purpose of this International Standard is to specify the data attributes and formats required for the creation of virtual garments, facilitating clear and synchronized communication of terminology.

This International Standard provides a platform that unifies specified vocabulary and terminology for the development of virtual garment systems. In addition, online consumers, fashion designers, manufacturers and retailers will be able to become familiar with and make use of this vocabulary.

NOTE Measurements of the body and garments are in millimetres (mm). Upward direction corresponds to the +y-axis (height), a leftward direction to the +x-axis (width), and a forward direction to the +z-axis (depth). The origin of body and garment is X = 0, Y = 0, Z = 0 in local coordinates; the common import/export formats for body and garment is dxf format.

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Clothing — Digital fittings — Vocabulary and terminology used for the virtual garment

1 Scope

This International Standard defines the terms that are commonly used for the digital fitting system. The digital fitting system includes virtual fabric, virtual fabric properties, virtual garment pattern, virtual garment pattern properties, virtual sewing line, virtual garment, and virtual garment simulation of a virtual garment on a virtual human body model for fit assessment.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1 General terms

2.1.1 Virtual fabric

2.1.1.1
virtual fabric attribute
virtual fabric attribute characteristic of virtual fabric

EXAMPLE Tensile modulus, bending rigidity, shear resistance, thickness, weight.

Note 1 to entry: Refer to ISO 5084, ISO 13934-2, ISO 14087, and ISO 14273.

Note 2 to entry: It can be retrieved from library or imported.

2.1.2
virtual garment pattern
shapes consisting of closed curves that mark the area of a digitized pattern to be used on the *virtual garment* (2.1.3)

Note 1 to entry: The example of a virtual garment pattern is shown in Figure 1.

2.1.2.1
virtual garment pattern properties
pattern consisting of contours and multiple *internal lines* (2.2.1.3), which are used to express seams, internal openings, fold lines and other garment characteristics

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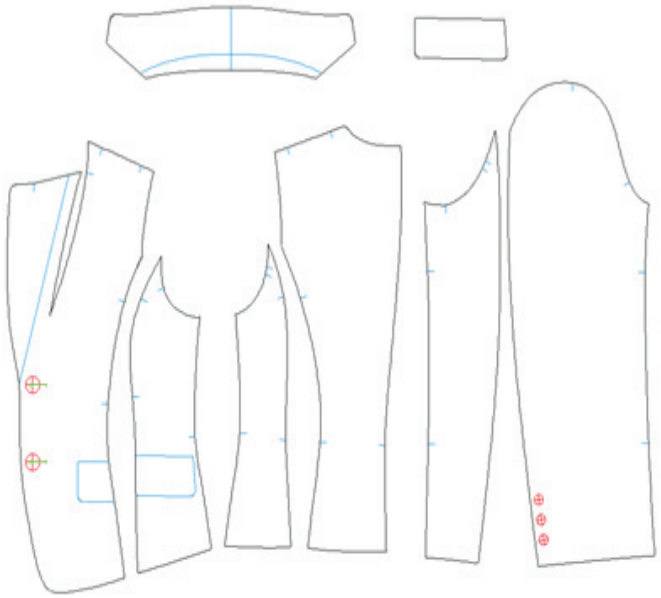


Figure 1 — Example of virtual garment pattern (jacket)

2.1.2.2
virtual sewing line
virtual line segment used to assemble patterns

Note 1 to entry: An example of virtual sewing is shown in Figure 2.

Note 2 to entry: For each pair of patterns to be sewn together, a pair of virtual sewing line segments is defined. The pattern pieces are then arranged in a space and the *points* (2.2.1.1) on each pair of line segments are pulled together through physical simulation. This process is repeated to join the pieces and create a *virtual garment* (2.1.3).

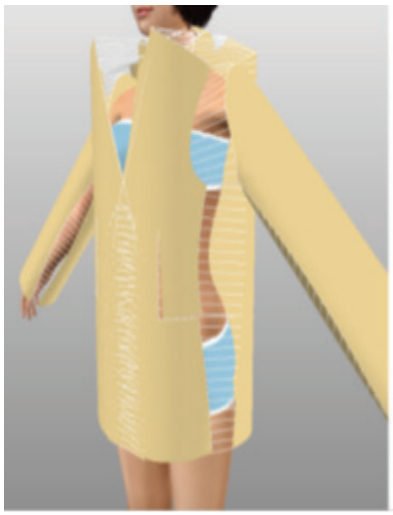


Figure 2 — Virtual sewing

2.1.3
virtual garment
three-dimensional clothing in digital form that exists in virtual space

Note 1 to entry: An example of a virtual garment is shown in Figure 3. An example of notation of virtual garment information is shown in Annex A. An example of data structure of virtual garment model is shown in Annex B.

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Figure 3 — Example of virtual garments

2.1.4
virtual garment simulation
creation and drape simulation of a *virtual garment* (2.1.3) for a virtual human body using a *virtual garment pattern* (2.1.2), virtual sewing and bounding volume

Note 1 to entry: An example of clothing simulation is shown in Figure 4.



Figure 4 — Garment simulation

2.1.5
digital fitting
qualitative and/or quantitative evaluation of overall and/or specific simulation of garment fit through the analysis of the garment balance, gap between body and garment (which includes cross sections), heat map, surface wrinkles, etc.

Note 1 to entry: Digital fitting may be used for many different areas of application of *virtual garments* (2.1.3), such as product development, marketing, etc.

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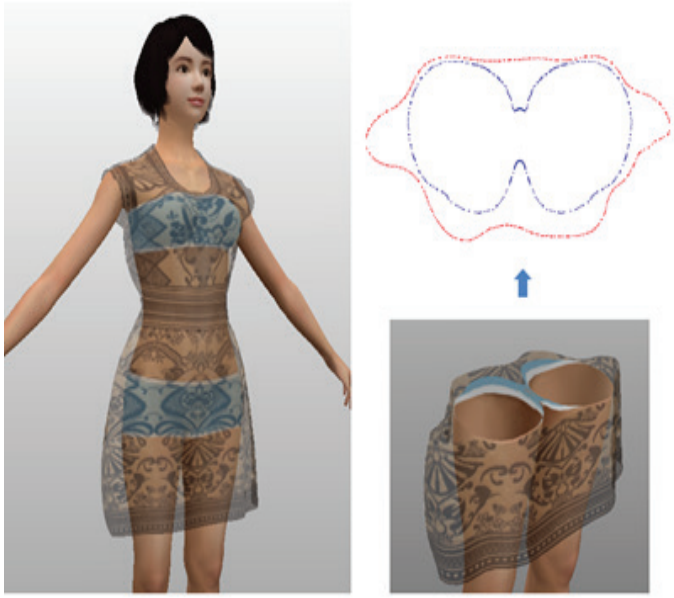


Figure 5 — Digital fitting



Figure 6 — Example of visualization of gap using pattern strain using colour scale

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2.1.5.1
garment balance
status of garment that hangs in the correct relationship with the virtual human body's size, contour and posture

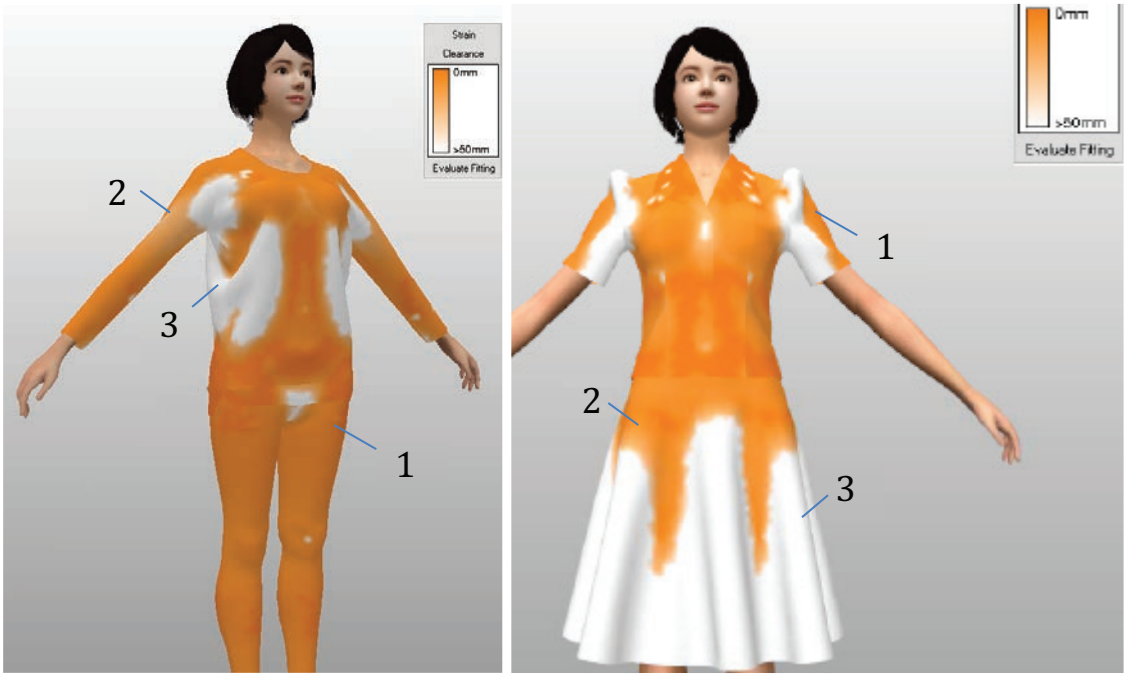
Note 1 to entry: The balance of a garment is usually determined by the hemline being parallel to the ground unless the hemline is asymmetrical. The balance is correct when the centre back, centre front lines and side seams are perpendicular to the ground.

2.1.5.2
pattern strain
amount of deformation caused on a garment pattern in the drape simulation process

Note 1 to entry: Pattern strain can be visualized in different ways. For example, pattern strain can be visualized through a surface colour map where the colour is darker as the strain increases and vice versa. White indicates zero strain.

2.1.5.3
gap
distance between a *point* (2.2.1.1) on a *virtual garment* (2.1.3) and the virtual human body

Note 1 to entry: Gap can be expressed through horizontal or vertical slices indicating the relationship between body and garment, or through the distance between a point on a virtual garment and the virtual human body, etc. Gap can be visualized as colour (heat) map. Colour becomes darker as the gap increases and vice versa. The colour scale can vary according to the type of software.



Key

1 tight
2 appropriate
3 loose

Figure 7 — Example of visualization of gap using colour scale

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2.2 Terms relating to basic composition and attributes

2.2.1 Composition of virtual garment pattern (refer to Annex A and Annex B)

2.2.1.1
point
point on a *virtual garment pattern* (2.1.2) indicating the notch point, sewing point, button, button position and grade point

2.2.1.2
outline
closed loop of lines necessary to form the contour of a pattern piece

2.2.1.3
internal line
lines that are not part of the *outline* (2.2.1.2)

2.2.2 Attributes of virtual garment patterns

2.2.2.1
layer order
sequence of layers of a *virtual garment pattern* (2.1.2) from the body in a multi-layered *virtual garment* (2.1.3)

Note 1 to entry: Lower layer numbers are simulated closer to the body, and it is impossible to wear identical layer numbers simultaneously.

2.2.2.2
layer structure
different structural layers in one item of clothing, such as lining or interfacing inside a jacket

2.2.2.3
sewing order
sequence in which virtual sewing takes place

2.2.2.4
mechanical property
property of a virtual fabric in drape simulation that differs from properties of a real fabric

Note 1 to entry: A virtual fabric uses a cloth physics model to simulate the physical properties of a material which may include tensile modulus, bending rigidity, shear resistance, etc. in warp and weft (refer to ISO 5084, ISO 13934-2, ISO 14087 and ISO 14273).

Note 2 to entry: There are several methods for representing mechanical properties of virtual fabric, such as orderly structure of particles with concentrated mass, rod-based model for knitted fabrics, etc.

2.2.2.5
surface appearance
texture maps and texture functions of light scattering from image-based models or procedural models for rendering the appearance of different materials in different lighting conditions

Note 1 to entry: For the texture mapping, texture image used for the visualization of textile design or additional surface characteristics, such as trimmings, buttons, zippers, etc. An example of a texture mapping is shown in Figure 8.

Note 2 to entry: More sophisticated surface features such as fine wrinkles, woven structures and fur can be expressed by combining other types of texture maps.

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Figure 8 — Examples of virtual garment texture mapping

2.2.3
mesh structure of virtual garment patterns
areas of the *virtual garment pattern* (2.1.2) divided into polygonal elements as the basic element for physical calculation during clothing simulation

2.2.4
spatial arrangement of virtual garment patterns
information on location of pattern on a bounding volume surface that surrounds certain body segments

Note 1 to entry: An example of a spatial arrangement of a *virtual garment pattern* (2.1.2) is shown in Figure 9.

Note 2 to entry: For example, a sleeve pattern is wrapped around the bounding volume of the arm, and a slacks pattern is wrapped around the bounding volume of the legs.



Figure 9 — Example of arrangement of virtual garment patterns

2.3 Terms relating to optional composition and attributes

2.3.1
grading rule
method to increase or decrease the *virtual garment pattern* (2.1.2) size from the control points with size intervals based on changes of the human body dimensions

Note 1 to entry: Refer to ISO 8559.

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