“FASHION IN A DIGITAL ERA”
NEXA FOR TWO AND THREE DIMENSIONS: FREEDOM FROM REPETITION
AREA 2 – DIGITAL TECHNOLOGIES

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ABSTRACT

At present, digital society has made it possible to generate two-dimensional paper patterns from three-dimensional forms with some scanners and applications. Although development is undeniably still in process, it is expected that such methods will ultimately be simplified and highly accurate.

With three-dimensional expression using two-dimensional digital data also possible, the addition of Kawata Evaluation System (KES) data and fabric features enables the mapping of folds, drape, other such expressions and of pattern information. The results, however, can appear dull, akin to paper craft (dress-up dolls) or a carbonated beverage that has gone flat.

In terms of the cause of this, the issue of ironing has arisen. Fabric from which clothing is made changes markedly in accordance with climate conditions (temperature, humidity, etc.). In clothes-manufacturing processes, cloth is altered through the addition of temperature, pressure, humidity and dryness, with rounded solids ultimately achieved from flat cloth.

Analyzing these complicated changes and subjecting various algorithms are subjected to data reduction will likely produce more realistic end products.

1. Introduction

1.1 Background

In the beginning, clothes-making necessitates confirmation and correction using planes (2D) and solids (3D). Analog methods involve repeated exchanges of information between them to achieve a finish that meets the required image.

What about the digital world? Here, apparel (2D) and virtual simulation (3D) serve as typical examples. Development is possible from 2D to 3D and vice versa. Unfortunately, because development from only one direction is the main, multiple applications must be used to work in both directions. If exchanges that utilize the advantages of both 3D and 2D become possible (as with analog), freedom from the current repetitive work will be achieved, as it has in other industries.

Thus, the changes in digital technology henceforth that will enable related interchange must be explored.

1.2 Extendibility of Apparel CAD

Originally, the OS for apparel CAD had to be specialized (Unix, etc.), but the advent of all-purpose OS, such as Windows, and global-scale manufacturing triggered not only exchanges with other companies' CAD but marked improvement in extendibility to non-CAD applications.

Here, the focus will be on the relationship between CAD (2D) and computer graphics (3D). This extendibility seems to be making major contributions.

Table 1. Extendability of apparel CAD: CAD to CAD

Interchange between DXF and AAMA formats is possible.

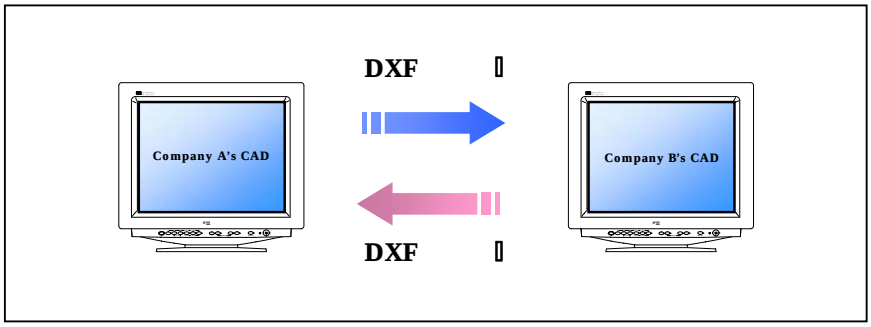
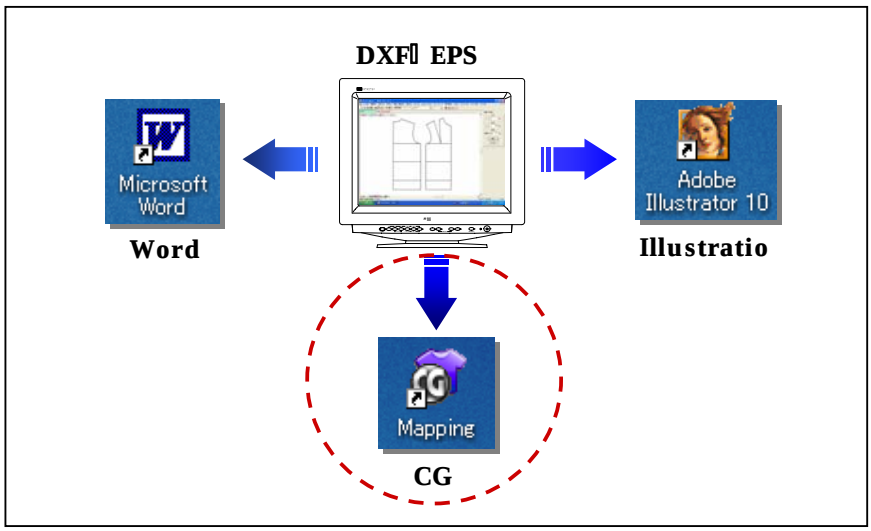


Table 2. Extendability of apparel CAD: CAD and non-CAD application

With DXF and EPS formats, CG-related information can be provided with Microsoft Word and Adobe Illustrator.

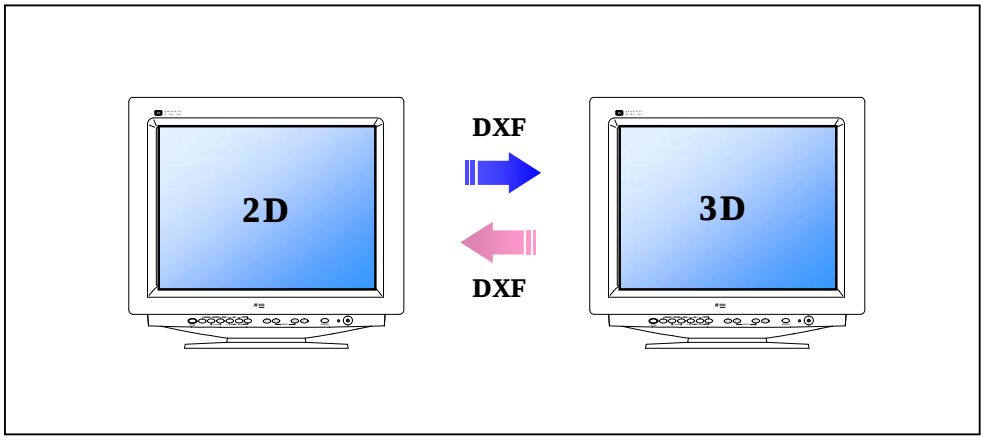


1.3 The Worlds of 2D and 3D that DXF Format Mediates

With expression in CG (3D) using CAD (2D) data in DXF format constituting the main, the viewpoints (means of expression) of individual companies look the same.

In contrast, CAD (2D) patterns can also be made using CG (3D) data. Although the same interchange among applications is not possible, it is possible that productivity will rapidly improve, making related developments eagerly awaited.

Table III. Data delivery with CAD（2D） and CG（3D）

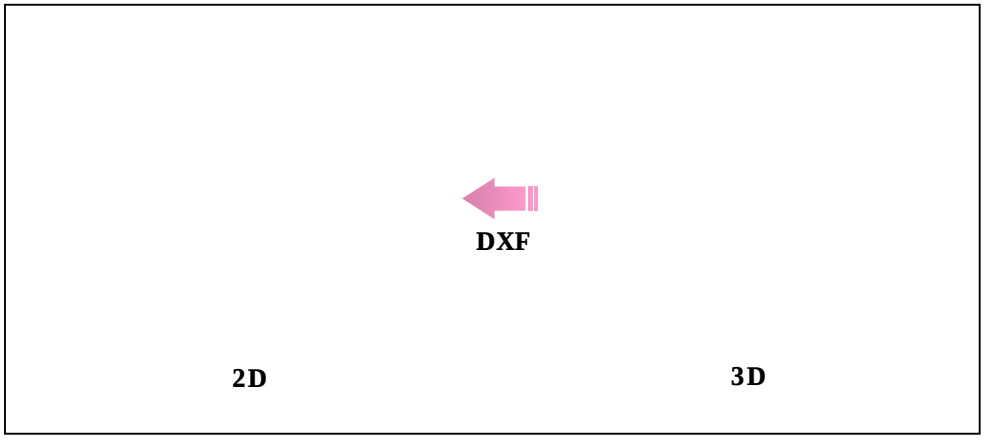


2. Actual Examples of 3D (CG)

2.1.1 Developing 2D (CAD) from 3D (CG)

Presented next is a system for developing 2D paper patterns from the settings for silhouettes, darts and design lines made from 3D solid shapes.

Table IV. Developing 2D (CAD) from 3D (CG)



2.1.2 Process for Obtaining 3D Data

The solid 3D shape (body) that will serve as the standard can also be created in conformance with individual body types with methods and measurement data using virtual bodies. The method presented here uses measurement data.

Table V. Measurement using a 3D measurement system (Bodyline Scanner)

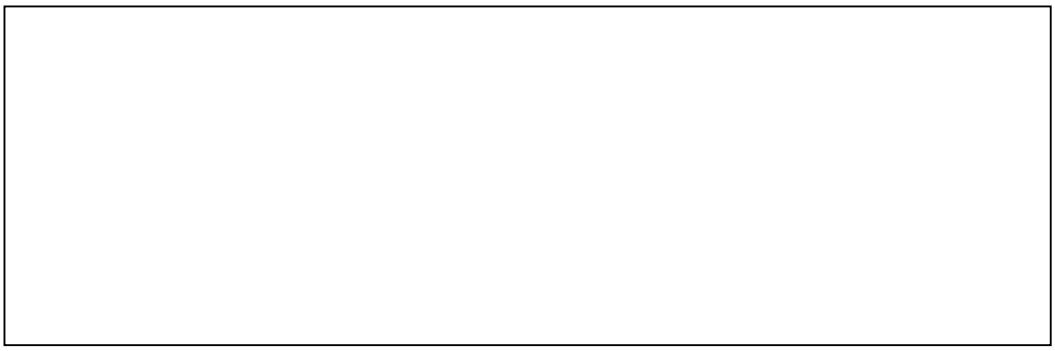


Table VI. Body-based clothing fitting

With cross sectional display, roominess can also be confirmed.

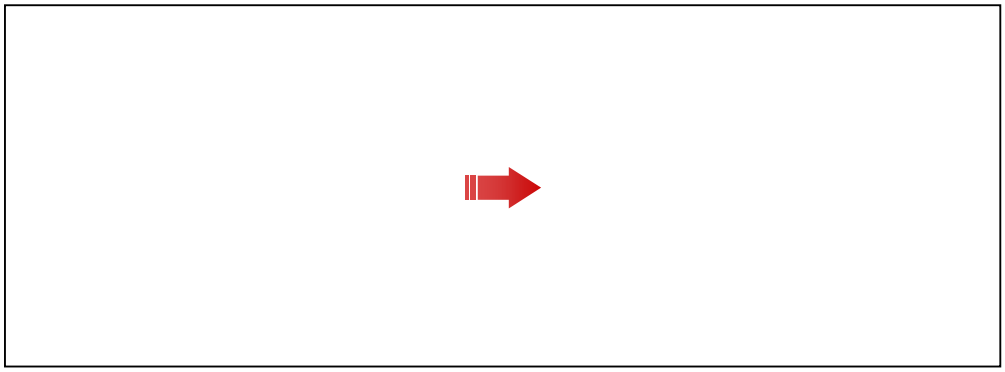
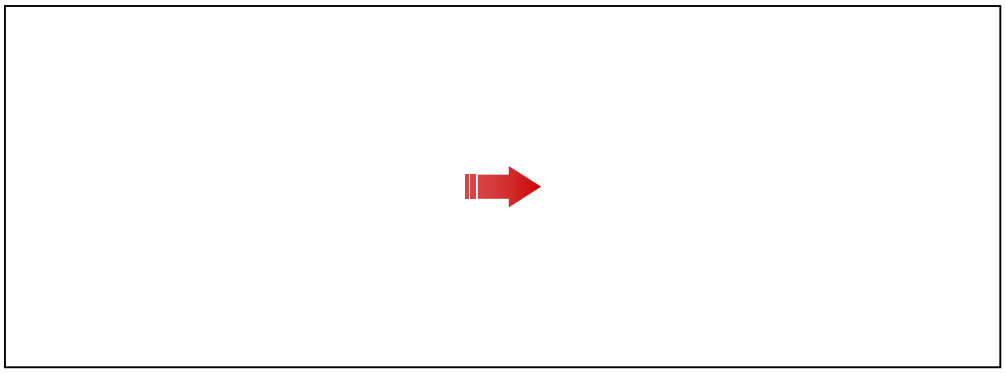


Table VII. Adding design lines, etc., after completing the silhouette

Materials can also be mapped.

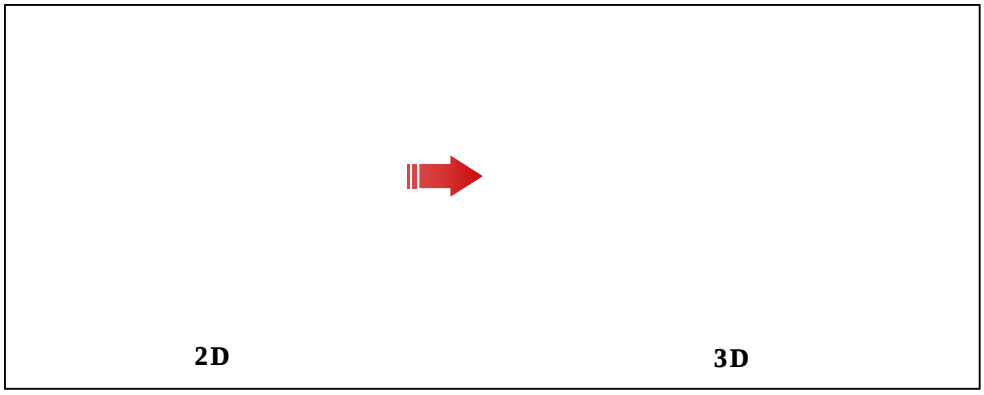


2.2 Developing 3D (CG) from 2D (CAD)

This is a method for expressing 3D silhouettes using 2D paper-pattern data, body data and the like. Silhouette expression and materials can also be mapped.

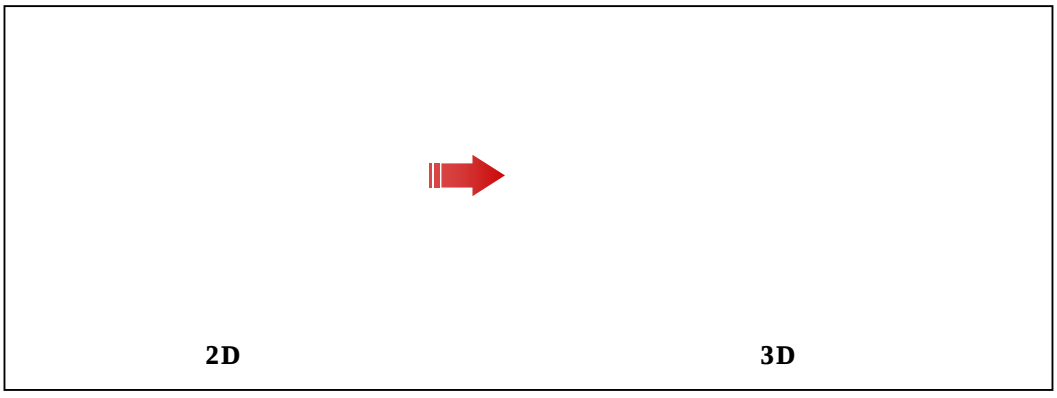
2.2.1 Adding Fabric Features to Silhouettes

Table VIII. Adding mass to fabric features (shear, tension and bending) from Kawata Evaluation System (KES) data makes it possible to express differences in silhouettes, drape and the like.



2.2.2 Adding Material Expression to Silhouettes

Table IX. **After silhouettes have been completed, expression of actual materials and adhesion (mapping) of cloth created onscreen is possible.**



2.3 3D (CG) Mapping Only

Instead of using silhouettes achieved by means of 2D paper-pattern data, body data and fabric features, fabric data can be mapped onto photographs and illustrations of the real article.

2.3.1 Actual Examples of 3D Mapping

Table X. Mapping of fabric data using existing image data

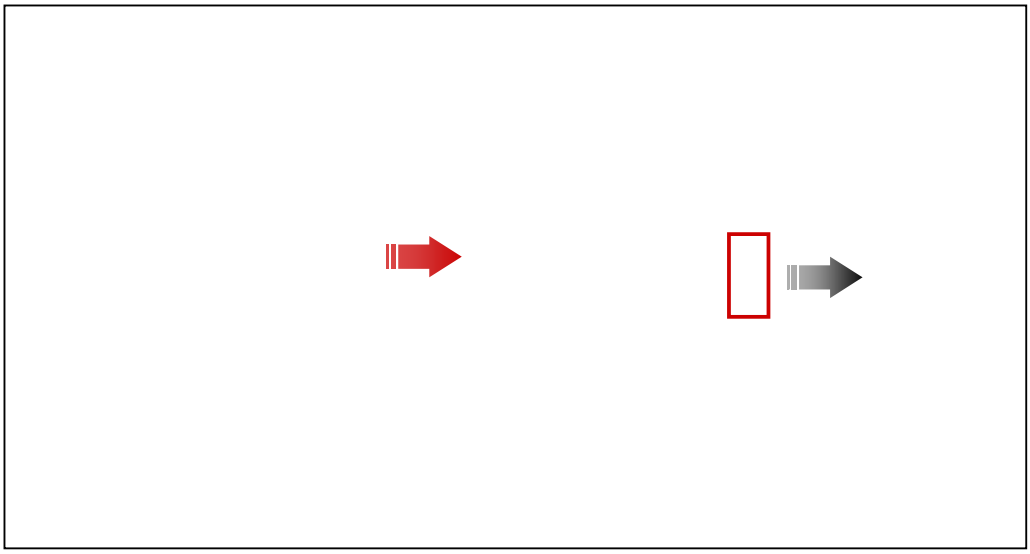
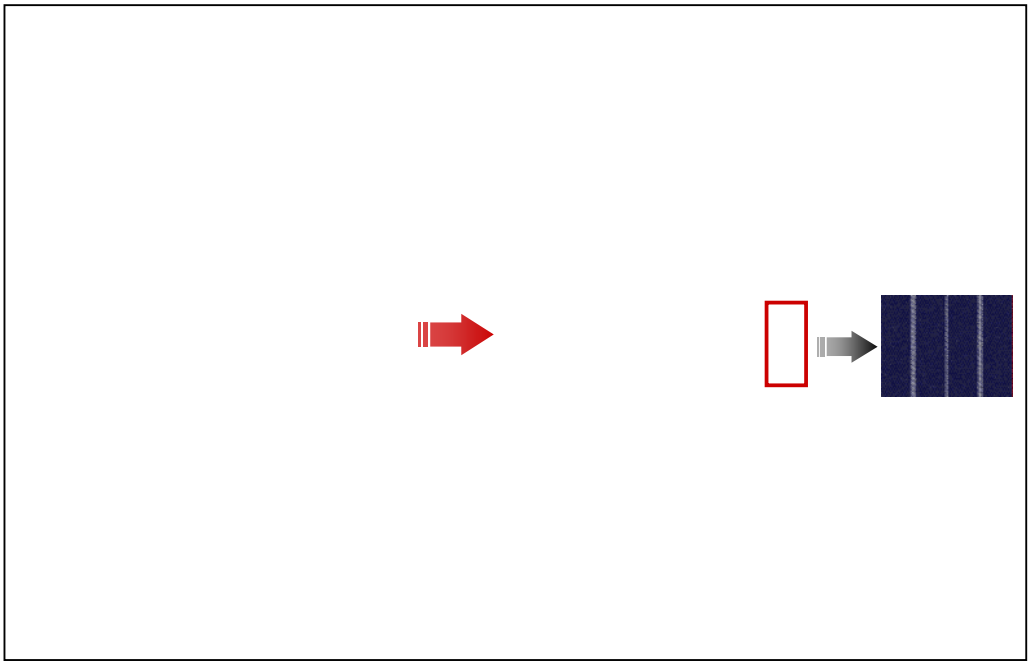


Table XI. Mapping of fabric data using existing image data (illustration)



2.3.2 Tricks to 3D Mapping

Photographs and illustrations of the real article onto which fabric data has been mapped are not just left with such data affixed but are imparted with movement by bending and twisting the surface of the fabric and the like, making it possible to express perspective. Tricks to doing so (mesh function) will be presented hereafter.

Table XII. Applying mesh (shading) to image data

Adjusting mesh on image to depict draping

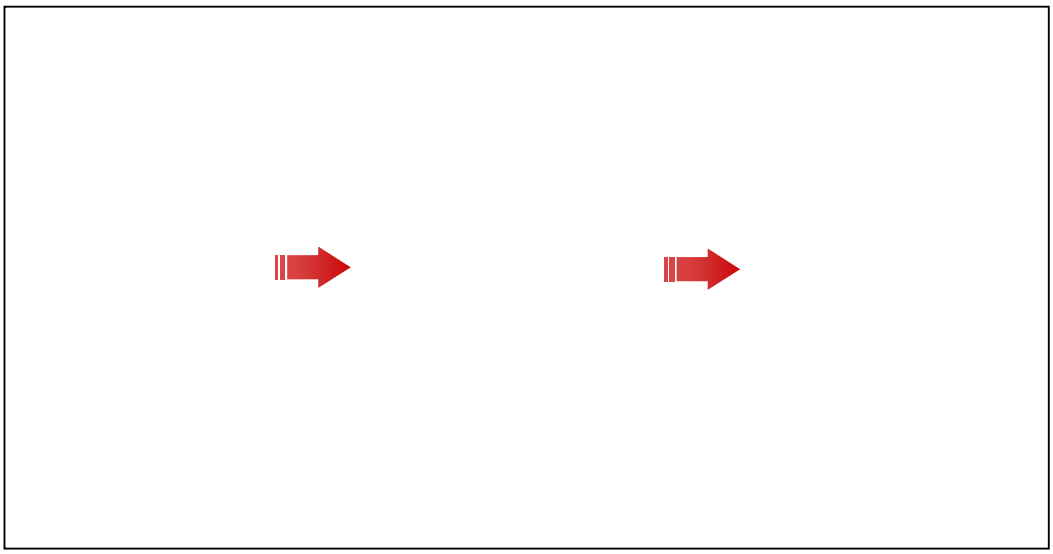
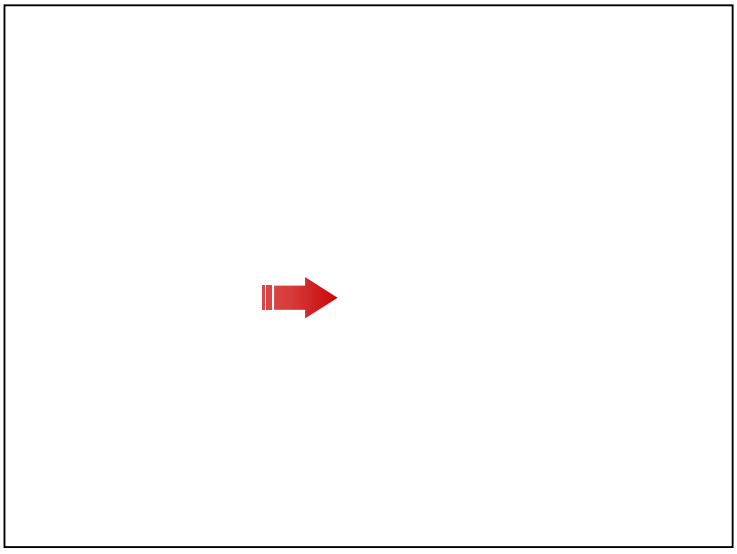


Table XIII. Affixing material samples and adjusting pattern size and position

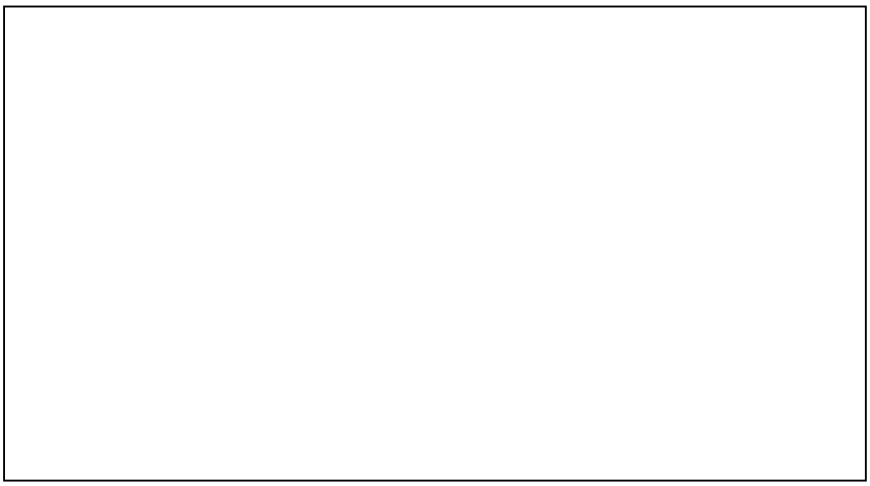


3. Discrepancies in Results

Major discrepancies in results occurred when 3D was expressed with digital processing alone (CG from CAD) versus when it was expressed using analog materials (photographs, illustrations, etc.).

When analog materials were used, the result was that images were matched beyond expectations because the basis had been completed. In contrast, when 3D was expressed only with digital processing, although there might have been differences from the original aims and good simulation achieved, the desired “roughness” of analog was lacking. With a little more f depth, shadow, movement and other such expressions added to materials, better results could likely be achieved.

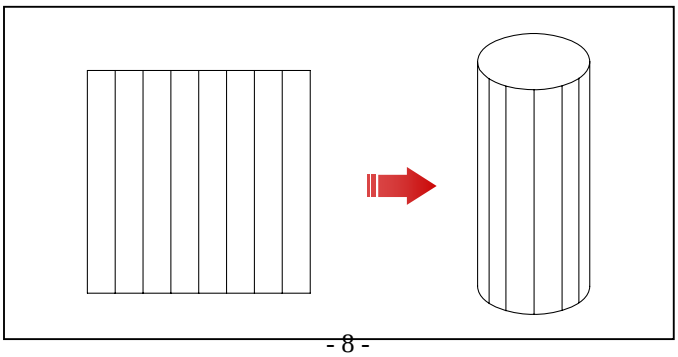
Table XIV. Differences between analog and digital



4. Methods for Altering Expression

When mesh (shading) is applied evenly, the result can be too flat; it is thus effective to modify spacing unevenly to achieve perspective and to provide expression through slope that matches the grain of the cloth, bending that matches images and the like.

Table XV. Example of altering mesh



5. Remaining Issues

Although it is effective to utilize mesh with existing images, it will involve working from around 50%, rather than from close to zero. With effort, realism will increase proportionally. However, working on an all-digital basis is likely not possible, owing to time restrictions.

The processes necessary for achieving a round solid from flat cloth are sewing and ironing. Ironing is of particular importance, as is reflected when development proceeds to three dimensions; its effects are tremendous for pattern orders (PO) and easy orders (EO), as well. Already simulations are being actively conducted for customizing automobiles and housing (interiors and exteriors). For clothing, as well, “texture” is another element that plays a major role in conveying product image to customers.

Table XVI. Flat pattern and product drawing

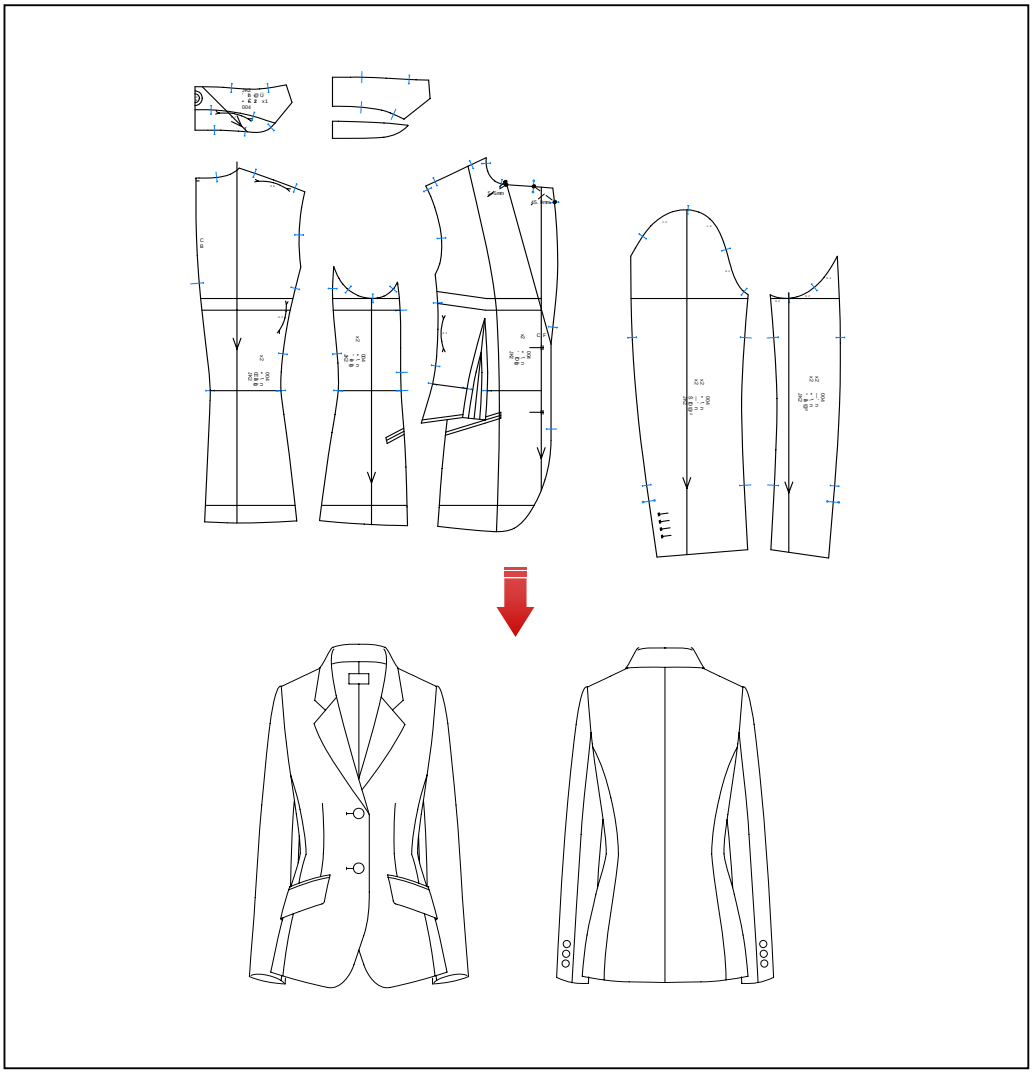
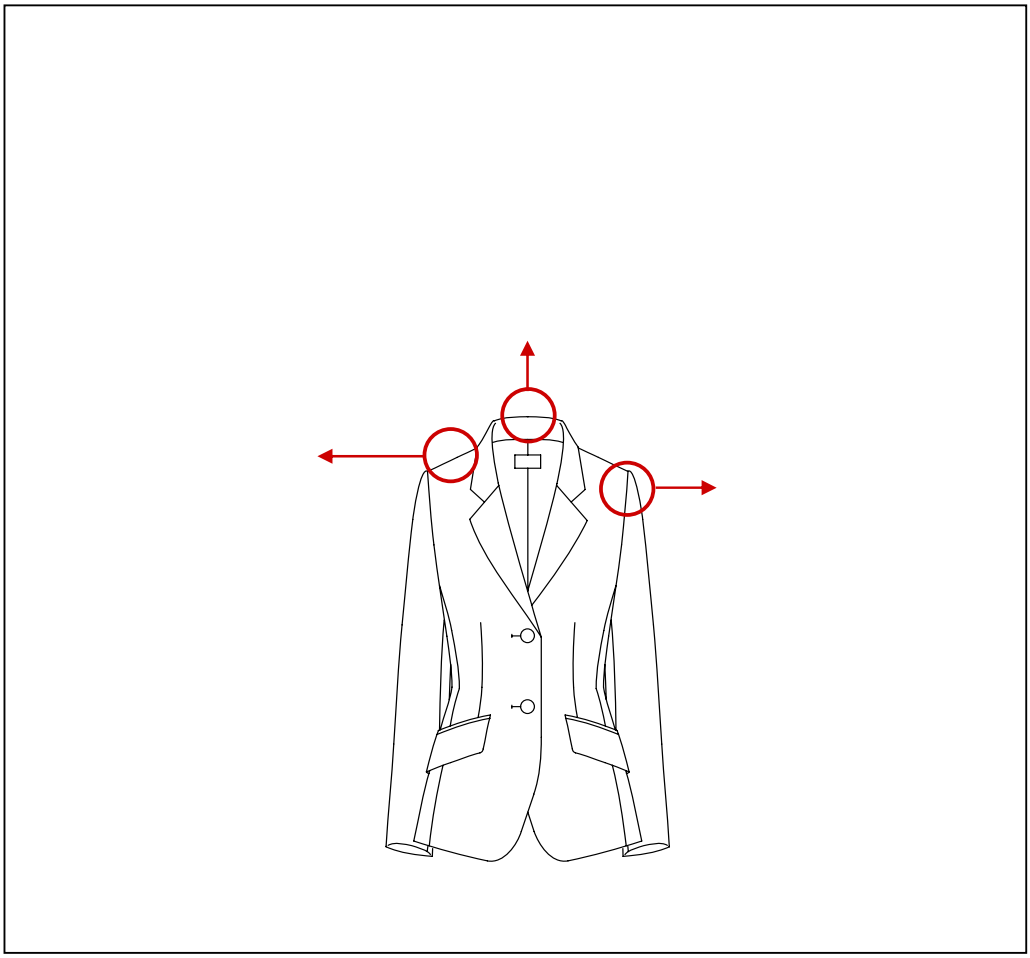


Table XVII**.** Example of adding roundness to a flat pattern



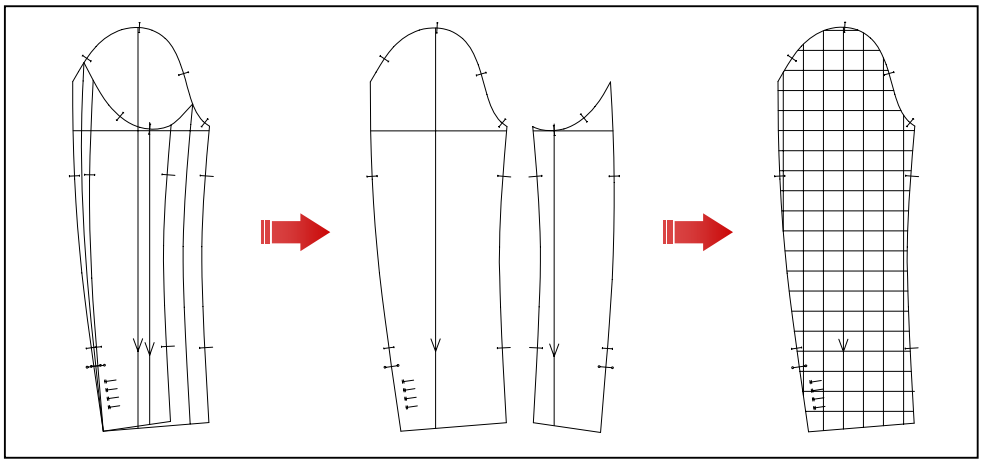
6. Conclusion

The effects of applying mesh to a completed item and adding expression were described, yet how would it be to add mesh information to flat patterns in advance? The method would involve advance registration of the places where shape will change and fine adjustment of mesh in accordance with the silhouette, cloth grain, etc., of items that had been fitted to virtual bodies.

To utilize digital data so that it approaches analog, satisfying results will not likely be obtainable without the addition of ambiguities that cannot be expressed numerically. Although the possibilities are limitless, methods will likely be determined by the requirements of those who will use them.

In short, what is required of digital is that it be natural.

Table XVIII**.** Adding mesh to a flat pattern



7. Information Resources

Digital Fashion, Ltd.: http://www.dressingsim.com/

looKStailorX

Technoa Inc. : http://www.technoa.co.jp/index.html

i-Designer

Toray ACS, Inc.: http://www.toray-acs.co.jp/

CG Magic Mapping

Hamamatsu Photonics K.K.:

http://jp.hamamatsu.com/index.html?lang=ja&ext=html

Bodyline Scanner

YUKA & ALPHA: http://yuka-alpha.seesaa.net/

Alpha Gear

Bunka Fashion College
3-22-1 Yoyogi, Shibuya-ku,
Tokyo, Japan 151-8522