



Rapid Prototyping with Vidya

The development of virtual prototypes is a practice that has been used for automobile manufacturing for years and is now also beginning to be employed by the clothing industry. However, in contrast to automotive design, the draping characteristics of fabrics add another layer of complexity to this process when it is employed for clothing. Cloth cannot be permanently shaped like steel sheets. Instead, it must instantly and continuously adjust to the wearer's movements.

Rapid Prototyping with Vidya for the Clothing Industry

- Two-dimensional patterns converted in virtual materials;
- Anisotropic material characteristics;
- Scanned cloth textures;
- 3-dimensional buttons and accessories;
- Realistic quilting lines and seam addition;
- All cut sections virtually sewn together in minutes;
- Simulation using dimensionally realistic avatars...
- Whose movements...
- Mimic an actual article of clothing down to the last detail.

Simulation is the magic word for the creation of new prototypes. Thanks to "rapid prototyping" we can now quickly obtain results in our search for an optimal fit, in visualizing collection themes without having to create a sample and can play with various combinations of material behavior and design even if the fabric for the design is not yet available.

Thanks to the unique simulation with Vidya draping fabrics an advance into the future of apparel development is already possible today. With Vidya, a product has been created whose application possibilities range far beyond simply creating an apparel collection in the clothing industry to also include applications in computer and video games, animated film and Internet shops.

In this context, simulation is understood to mean the integration and virtual representation of all relevant data.

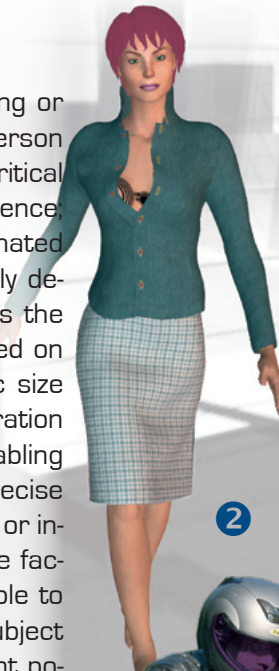


2. The Animation:

One characteristic that sets the Vidya software apart is the animation of the avatars during the simulation. The avatar can perform simple movements so that the user can determine the fit and overall effect of the clothing. These movements include raising and lowering the arms, sitting, standing up, walking and turning in place. Garments that hang away from the body are also animated during these movements in the same way in which it would flow with the movements of the human body. Starting from its basic position, the body can be moved into different postures to support virtual fitting of even precise-fit functional clothing such as motorcycle gear that can be fitted with the avatar assuming various sitting postures on the bike. Currently, more complex movements such as parading down the runway are being developed to permit simulation of virtual fashion shows.

1. The Avatar:

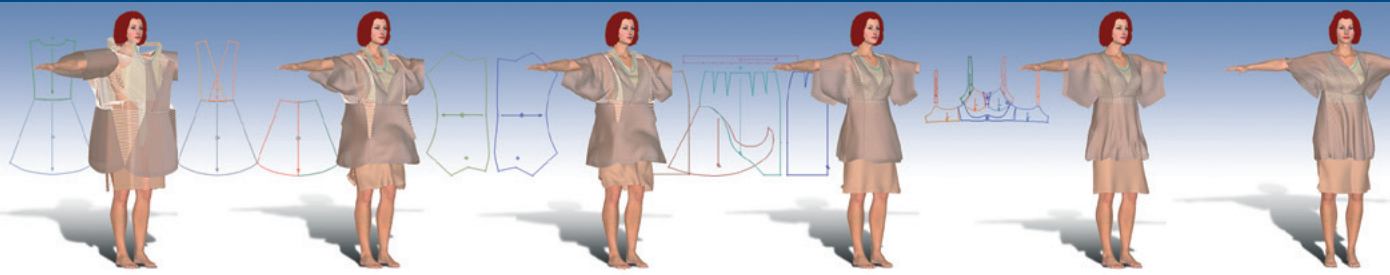
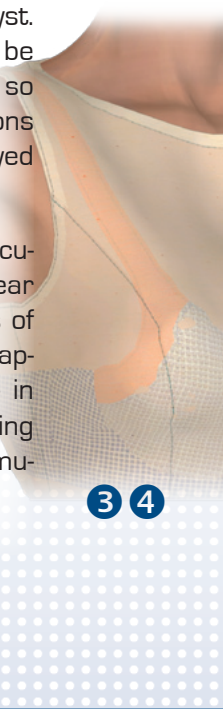
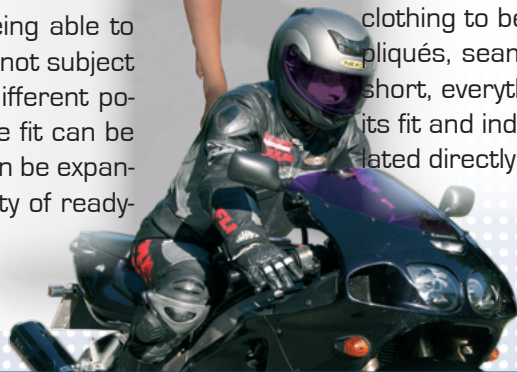
An avatar is an artificial human being or a graphic representation of a real person in a virtual world. The avatar is the critical element regarding simulation coherence; only a properly modeled and animated body allows clothing to be accurately depicted. In this respect, Vidya enables the creation of customized avatars based on the customer's market and specific size tables, as well as complete integration with body scanning technology, enabling the design team to work with the precise measurements of an individual client or in-house model. One not inconsiderable factor lies in the advantage of being able to clothe a realistic model that is not subject to body mass fluctuations of different poses and attitudes. Work on the fit can be reproduced at any time and can be expanded on the avatar with a variety of ready-to-wear sizes.



3. The Clothing:

Simulation should operate with actual data in order to provide results that are as close to reality as possible. This is why the Vidya software can be directly linked to the CAD system developed by assyst. This permits production-ready cuts to be transferred directly to the simulation so that the model maker creates simulations with the data that will actually be employed for production sewing.

This ensures a high level of process security for the simulation and allows clear inferences with respect to the articles of clothing to be drawn. Seams, buttons, appliqués, seam lines, linings and folds – in short, everything which gives our clothing its fit and individuality – can then be simulated directly.



4. The Fabrics:

The parameter-defined, virtual fabric from which the individual pattern pieces are combined into articles of clothing and they, in turn, create entire outfits, represents the heart of the simulation and is the decisive factor for the most realistic display. Virtual fabric is mathematics made visual, limited by physical properties such as the cloth weight, its elasticity, its drape and its compressibility. Naturally, simulation of all fabrics is anisotropic, i.e., with individual parameters for the warp, weave and diagonal directions to imitate the fabric's actual behavior. Vidya comes with a wide range of fabrics in its standard library which can be expanded by any fabrics and characteristics the user requires with the aid of the Drape-O-Meter (Hohenstein Institute) and a fabric's FAST parameters.

5. Textures and Designs:

Of course, visualization of clothing lives from the colors of its fabrics, seams, quilting, buttons, appliqués, fading and stitching which all combine to make a distinctive article of clothing. In this regard, there are no limits on the textures the user can employ. The user can display up to 256 different overlapping textures for every pattern piece so that, for example, a design can be applied to a fabric, a transparent washed-out effect can be laid on top of this, the fabric can then be quilted and a seam can be overlaid on the quilting. Textures can also be transferred to the simulation from scans in *.jpg or *.tga format, after which they can be freely scaled.

6. Objects:

Aside from the textures, three-dimensional objects also enrich the simulation. The simulation can also display any files in *.obj/*.mtl format and the information is included in the animation. This gives the user the option of representing, for example, a button as either a texture or a

3D object. A rose can also be placed on a lapel as a 3D object or a dress can be studded with "real", virtual sequins. Limits are set only by the user's imagination.

7. Lighting and Backgrounds:

Vidya also utilizes state-of-the-art technology when it comes to lighting the simulation and designing the environment. 360° HDR images are used for the background, that is, images that work with the expanded dynamic range of HDR technology that allows them to be lightened or darkened as desired with no loss of information. The avatar is positioned in the center of a spherical image and is illuminated by the mathematically determined light sources within the image to allow the simulation to be adjusted as realistically as possible to the environment. In addition, freely selectable light sources are also available to the user in order to define the specific scene. Aside from the standard shadow image of a 3D simulation, the presentation mode also allows the clothing and the avatar to be self-shadowing to create a photorealistic impression.

8. Tools and Aids:

Naturally, a virtual fitting requires certain tools. The user not only has pins and a tape measure available in the simulation, but also various display modes to help appraise the clothing. Individual pattern pieces can be displayed or hidden to see how the clothing flows along the body. Spacing fields that show the distance between the clothing and the body or the fabric's drape on the avatar can be activated. The resulting forces are indicated with the aid of color spectra to allow the user to judge whether an article of clothing is too tight or whether it simply fits snugly without restricting the body. Naturally, these display modes can also be combined with the animation of the avatar to show the fit during movement.



The close links between Vidya and cad.assyst allow a pattern piece to be selected from the simulation for direct processing in the CAD system and the subsequent update of the simulation with the pattern changes. In turn, this permits the model maker and the designer to adjust the cut directly and to seamlessly assess any alterations. As a special presentation feature, Vidya supports stereo projection of the simulation to create a realistic 3D effect with the aid of two high performance beam projectors and 3D polarizing glasses.

9. The Hardware:

Despite the complexity of the simulation, Vidya was designed to run on commercially available hardware and even on laptops. Following is a list of hardware and PC Windows requirements:

Processor:

Dual core > 2MHZ

Pentium IV HT > 3.6 MHZ

RAM: 2-3 GB

Hard drive:

20 GB of free memory

Graphics card:

NVidia graphics card \geq 256 MB RAM, OpenGL support, gaming card, at least model year 2006

10. The Process

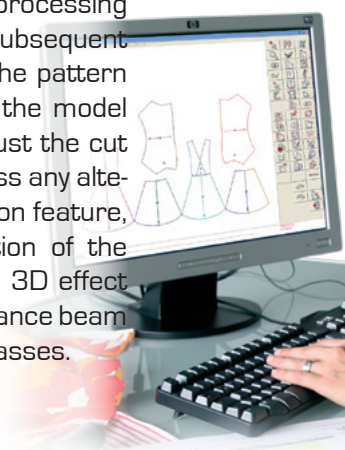
The simulation process starts in the cad.assyst program. It is here that the components to be used in the simulation are selected, after which their orientation is defined. What are the direction of the warp and weave? How does the component lie relative to the bodily axis? Where should a texture be applied? Which fabrics and linings are to be used? On what part of the body will the pattern piece be used? Once all this has been defined, the components are sewn together with the user specifying which lines are to be stitched. To complete the model, buttons and buttonholes as well as the locations for ap-

pliqués, embroidery, sequins and other accessories can then be selected. Lining fabrics are assigned to the outer fabrics and lines along which the fabric is to fold are selected. All this information is saved with the cut so that it only needs to be specified once. Once the information is transferred to a model's basic size, the related data can be used for any size and can be transferred to similar models.

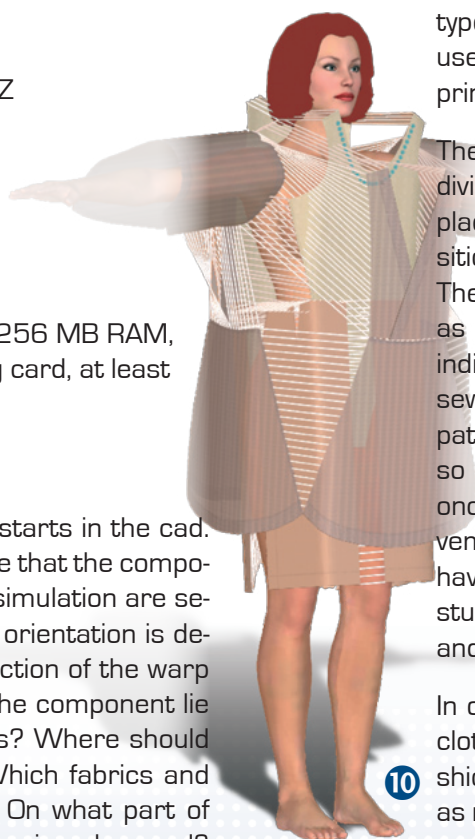
Once all the supplemental information has been provided the patterns are sent to the Vidya simulation. During the simulation the user can select or create an appropriate fashion theme for every article of clothing. In doing this, the user assigns the desired fabric properties and associated fabric drape to the clothing, determines the designs the fabrics are to have and specifies the thread colors and stitch types to be used for quilting. Finally, the user selects the appropriate accessories, prints and embroidery for the article.

The simulation is then started and the individual pattern pieces are automatically placed on the avatar in their actual positions on the finished article of clothing. The connecting seams initially appear as elastic threads that will then sew the individual pattern pieces together. Once sewing starts, the fabrics of the individual pattern pieces assume their properties so that the article of clothing looks real once sewing has been completed. A movement sequence can then be loaded to have the avatar assume the desired posture so that the user can check the fit and design.

In order to be able to judge the article of clothing within the context of various fashion themes for collections, Vidya allows as many themes as desired to be created and loaded with the article of clothing. This allows decisions regarding the design and the accessories with which the article is to be produced to be made in seconds and to determine whether the style fits in with the overall theme of the collection.



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There are numerous possible application scenarios and resulting advantages:

- Checking cuts and fits for various sizes;
- Performing before-and-after assessments of changes in cut;
- Plaid and stripe line position appraisal;
- Placement and size of pockets, separating seams and accessories all without having to create samples;
- Finalizing details to create production guidelines for the manufacturer using simulation screenshots;
- Decision-making aid when creating a collection by simulating clothing based on various collection themes;
- Reduction in the number of iterative steps during the development of new fits and collections;
- Reduction in shipping times for new patterns and precursors;
- Improved communications between cut, design, producer and client;
- Presentation of virtual models in online fashion shows or 3D presentations;
- Sales support for online shops through virtual fittings and fit and color selection;
- Client bonding in the made-to-measure segment through individualized avatars and design options for the clients.

cad.assyst

CAD data
(Cut with metadata)
to vidya.wrapper
(data management)



cad.assyst

Invoke the pieces in cad.
assyst and execution of
the desired command
(zoom piece)

vidya.wrapper

virtual.vidya

Replacement of the me-
tadata with simulation-
relevant data
(textures, materials)



virtual.vidya

Evaluation of pieces
selected in virtual.vidya
and the preferred
cad.assyst command.

Vidya – The Future Has Arrived!



viyda

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