

1 Publishable Summary

The FFD project aims to remove the main barriers inhibiting the wider adoption of virtual prototyping by textile and clothing companies by drastically improving the speed of obtaining realistic garment simulations, the accuracy of textile simulation and functional integration aspects. A new business model will offer strong improvements in product development efficiency and services at low-cost, while opening new market opportunities for CAD and PDM/PLM system vendors.

The main business objective of Future Fashion Design is to enable fashion development teams to unleash their joint creativity potential in an open, online collaborative system featuring rich 3D virtual representations that are closer than ever to reality. Several steps of the current production pipeline do not yet have an appropriate representation in the virtual prototyping process. A key overall technical objective is therefore to define representations of these steps which allow the user to retain the whole relevant product information throughout the various engineering stages.

The methods which are developed in this project will allow the automatic creation of seam definitions and textures, and formalize the representation of both in a way that makes it possible to cover the whole virtual product development pipeline. The increased accuracy and speed of the garment simulation will allow a quick and reliable evaluation of the virtual prototype. It also enables an efficient exploitation of the new level of integration that is provided by this support of the virtual phase between the first design steps and the final production of fabric and garment samples. The proposed future product development will thus be based on a completely virtualized design and prototyping process, and reduce the time to production for new collections.

1.1 Work Performed in the First Period

Future Fashion Design involves partners from the domains of applied research, textile CAD/virtual prototyping development, garment CAD/virtual prototyping development, web collaboration tool development and end users from the textile and garment industry. This setup of partners covers the complete development process of garments, starting from the design of a fabric up to the complete virtual production process. The main aspect of the first period was to find a way to convert the vision of FFD into a system architecture that is capable of handling a fully virtual production workflow, extending beyond the classical approaches.

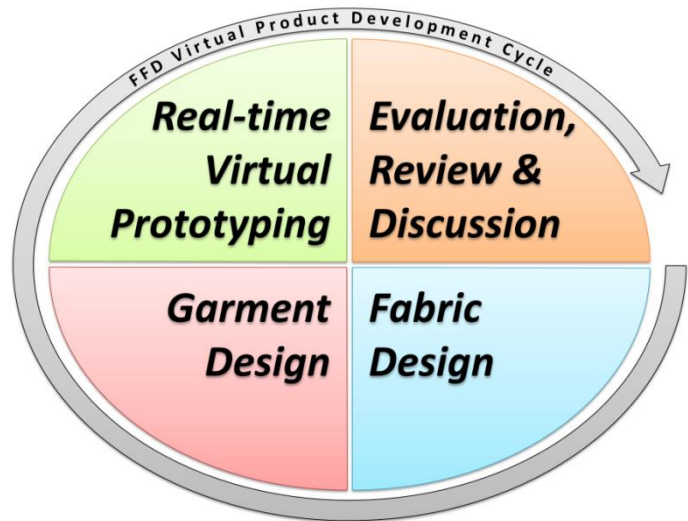
To achieve this, the project started with a requirement analysis of existing and future business and production workflows. Based on this analysis, the specifications for the design and development of the project's overall architecture, including a business framework, were developed. The contributions comprised a description of current product development workflow and possible use cases and detailed specifications of the collaborative platform including set up and management.

The specification of a high level architecture gave an overview of all necessary modules. Based on that, the development of first prototypes was started, with the intention of bridging the identified gaps between previously existing software systems and the necessary extensions to them.

Regarding the evaluation and dissemination of the project, first sketches for business cases, dedicated to the textile-clothing sector have been developed, in preparation for the future exploitation of the project results. A first version of the dissemination plan has been sketched, the web-site has been set up to make the progress of the project available to the public and the consortium agreement has been signed.

1.2 Work Performed in the Second Period

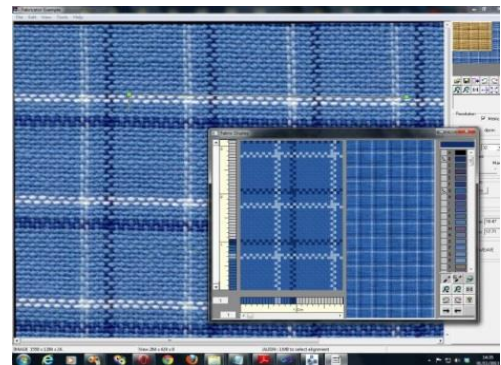
A main aspect of the second period was the development and evaluation of first functional prototypes necessary to build the architecture planned in the first period. The developed architecture roughly divides the new product development cycle in 4 functional blocks. Prior to FFD, each block was a world of its own. With FFD it is now possible to combine these blocks dynamically without losing established production processes. In this way, the overall production cycle is broken down into micro cycles, in which the single steps can be rearranged or even skipped entirely. A first presentation to the public of the overall system and all of its facets was given at the TexProcess fair in 2013. The public interest on the side of the garment producers was very high.



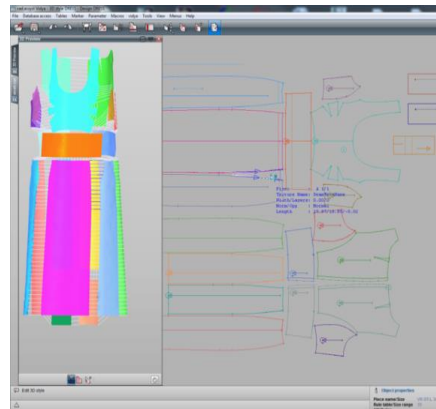
A first evaluation of the prototypes was performed by the end users. Development of the prototypes continued based on their feedback. A second evaluation is scheduled, as planned.

Achievements

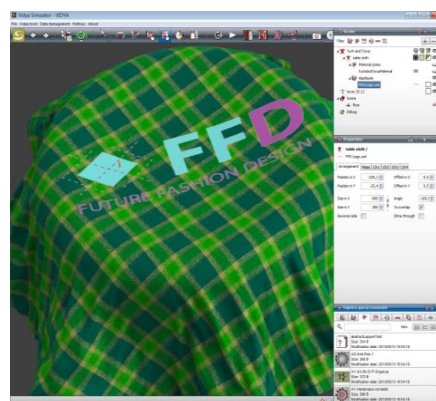
In the fabric design area, the ability to efficiently analyse existing fabrics was available with the start of Period 2. In conjunction with fabric design and the capability to directly export data for the Virtual Prototyping system, changes to a woven fabric material can now be performed within seconds. With this technique the old process of scanning fabrics followed by several hours up to several days of time consuming manual corrections and rearranging is obsolete.



In the garment design area, newly developed methods for pattern detail definition and automatic seam generation were presented, which speed up the pre-processing of a garment design for a virtual prototyping run, which was previously a time consuming manual process. Additionally, the higher level of detail of patterns now enables the system to handle the properties of the invisible layers inside a garment, which often have mechanical properties. For example, cloth strips or loose strings create certain behaviour, which now can be simulated.



The real-time virtual prototyping system performing physical simulation of mechanical and optical effects was extended to achieve a higher simulation resolution by introducing parallel and adaptive simulation techniques. The simulation result is visualized by a high quality rendering system. It is capable of handling virtual fabric information from the fabric design process with high dynamic range lighting and constant time self-occlusions. Thus, an observer can judge the curvature and form of an object, which is very important in the garment design process.



The web-based collaboration tool called CDP (Collaborative Design Prototype platform) bundles all communication and control aspects of the production design process. Results from the virtual prototyping process are provided via a special stand-alone viewer. In this way it is possible to discuss, review and evaluate designs and get feedback from the design team. Thus, all steps in the FFD Production Design Process can be performed in an arbitrary sequence that fits best for the current situation.



1.3 Expectations in the Third Period

With the end of Period 2, all important functional building blocks are available and have been run through a first evaluation with end users, followed by feedback and updates of the prototypes. In the third period, the prototypes will be finalised. The end users will thoroughly evaluate them through the specified Pilot Installations. This will be followed by the finalization of the overall process and final adjustments to the software. Finally, a report on the industrial demonstrator will be made available at the end of the project.

More concrete demonstrators will lead to more precise plans for the dissemination and exploitation of the projects results. A final plan will be made available at the end of the project, depicting the path of FFD technologies beyond the project's timeframe.

1.4 Potential impact of FFD

The project brings together a wide range of experience and know-how of actors from different European countries. Only in this way can FFD follow this multi-disciplinary approach addressing a classical industrial European sector. While the start of FFD was centred on the analysis of general requirements and preconditions, the 2nd period focussed on development and evaluation, followed by an improvements phase of the prototype. These steps intensively involved the end users of FFD, guaranteeing a high impact potential of the project results.

The FFD project addresses the needs of the European textile and clothing industry. At the current state the available results of the project make it possible for the first time to offer not only a nice looking virtual garment, but a plausible representation of a physical sample in a completely virtual prototyping environment with the possibility to access design results by all members of the involved design teams in an online collaborative environment.

The agility introduced by FFD into the garment production process puts production companies in a better position when competing with companies optimized for mass production. More agility in the production process boosts the capability to convert ideas into innovative products and even incorporate requests from customers or changes on the fly.

Looking at the European garment industry, it is a market that is focused on flexibility and customer requests. Most of the designers are located in Europe while the mass production is done in Asia. Thus, it is expected that FFD will have more impact on the European market since its target is enhancing the flexibility of production, which is difficult to achieve when using mass production.

The current project results already show a strong reduction effect on a significant portion of the product development costs in the garment sector, an important step for SMEs and large companies in the strained European market. Therefore, Period 2 of the project have increased the potential that the results will strengthen the competitiveness and competencies of fashion companies in Europe.

More information can be found on our website:
www.future-fashion-design.eu