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Visualization of an End Gondola Display (EGD) Using 3D Digital Prototyping

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Abstract

In the modern retail industry, product displays play a strategic role in attracting consumer attention and influencing purchasing decisions. One commonly used display medium is the End Gondola Display (EGD), a display rack placed at the end of a row of gondolas to highlight featured products or specific promotions. This research aims to develop EGD visualization using a 3D digital prototyping approach as an effective, efficient, and adaptive design solution for production and marketing needs. The digital prototyping method allows designers to create a visual simulation of the product before physical production. In this study, a 3D EGD model was developed using digital modeling software that supports dimensional precision and design flexibility. The process begins with analyzing shelf requirements, planning the shape and dimensions, and producing the final rendering as a presentation medium. This approach minimizes production errors, accelerates the validation process, and reduces material costs due to repeated physical revisions. The results of the research indicate that EGD visualization in the form of a digital prototype facilitates design evaluation, including structural, aesthetic, and functional aspects. Digitally visualized designs can be used as direct references by production and marketing teams, accelerating decision-making by management or clients. Furthermore, this method opens up opportunities for cross-disciplinary collaboration, including design, production engineering, and branding strategy, within a single, integrated work process. The conclusion of this study confirms that 3D digital prototyping is a relevant and solution-oriented approach for designing End Gondola Displays in today's creative industry. This method supports work efficiency, design accuracy, and effective communication within the production chain and visual product promotion.

Keywords: *End Gondola Display, Digital Prototyping, 3D Visualization, Product Design, Retail Industry, Production Efficiency, Promotional Display*

1. Introduction

The development of information technology has led to the emergence of various visual aids that support information systems in various sectors, including the retail industry. One technology that has developed significantly is 3D digital prototyping, which allows for virtual design visualization before the production process begins. This technology offers benefits in terms of cost efficiency, time efficiency, and a more accurate understanding of the design for both clients and manufacturers.[1]. In the retail industry, End Gondola Displays (EGDs) play a strategic role as a visual promotional medium in aisle closures. However, the conventional EGD design process often creates communication barriers between manufacturers and clients, as experienced by CV Grafindo Medan.[3]. The discrepancy between the initial design and the final product is a major obstacle in the production process.[4] Through the implementation of 3D digital prototyping, companies can improve design accuracy, accelerate the production process, and provide clearer product visualizations to clients. This research was conducted to explore how 3D digital prototyping technology can be effectively applied in the design and production of EGD at CV Grafindo Medan, as well as to provide an innovative contribution to technology-based retail design. [5].

2. Theoretical Review

2.1. Three-DimensionalConcept

Three-dimensional (3D) refers to the representation of an object or space that has length, width, and height. This concept is applied in various fields such as mathematics, art, graphic design, animation, and digital technology. In digital visualization, 3D enables the creation of realistic spatial forms using Cartesian coordinates (X, Y, Z), providing a sense of depth to objects. The term "3D" also covers various technologies such as 3D video, film, and 3D glasses, although its usage is sometimes inaccurate in the context of computer visualization. [4]

2.2. PrototypingMethod

3D prototyping is a process aimed at building a design based on customer requirements that are not explicitly defined in detail for inputs, processes, or outputs. The prototyping method begins with gathering requirement data, carried out through communication with the customer. Developers and designers determine the needs, objectives, and concept of a product. Development then proceeds to build a prototype model that can represent the product. [4]

2.3. Low-Fidelity Prototyping and High-Fidelity Prototyping

This is a technique in Augmented Reality that uses markers or visual cues as references to display digital elements in the real world. The visual markers referred to are usually images or unique patterns that can be recognized by a device (camera) to determine the location and orientation of the digital object to be displayed.

2.4. SketcHup

This is a technique in Augmented Reality that uses markers or visual cues as references to display digital elements in the real world. The visual markers referred to are usually images or unique patterns that can be recognized by a device (camera) to determine the location and orientation of the digital object to be displayed.

2.5. Adobe Photoshop

Adobe Photoshop, commonly referred to as Photoshop, is an image editing software developed by Adobe Systems. This software is specifically designed for photo editing, image manipulation, and the creation of graphic effects. Photoshop is known as a powerful tool in the world of design and photography, offering various features that allow users to create attractive and creative graphics. [10]

2.6. Unity Hub

Unity Hub is a project management application developed by Unity Technologies to help users manage the entire Unity-based game and application development ecosystem in a more organized and efficient way. Unity Hub serves as the main control center, allowing users to manage various versions of the Unity Editor, create, open, and organize Unity projects, as well as install additional modules such as build platforms (Android, iOS, WebGL, etc.). The application is compatible with Windows, macOS, and Linux, providing cross-platform flexibility for developers. One of its main features is the ability to easily manage and switch between different versions of the Unity Editor—an essential function since each project may require a specific editor version to remain compatible and stable.

3. Method

3.1. Analysis

System analysis is carried out to understand the needs and problems in the process of designing the End Gondola Display (EGD). The purpose of this analysis is to identify weaknesses in the currently used system and to evaluate how the implementation of the 3D Digital Prototyping method can provide a more efficient and effective solution.

3.2. Proces Analysis

3D Digital Prototyping is a modern method used to visualize, test, and refine product designs digitally before they are manufactured. In the context of designing the End Gondola Display (EGD), 3D Digital Prototyping uses design software that enables the creation of highly detailed virtual models. These models can include.

1. Dimensional structure
2. Material Visualization
3. Data Collection
4. Digital Design
5. Design Revision
6. Output

Based on the previous analysis, to run a video illustrating the visualization of the End Gondola Display (EGD) using the 3D Digital Prototyping method, several hardware and software components are required. The requirements are as follows

1. Windows 10 as the operating system or a newer version.
2. Intel Core i7 / AMD Ryzen 7 or higher.
3. Minimum 16GB RAM (32GB recommended for complex rendering).
4. NVIDIA GeForce RTX 3060 / AMD Radeon RX 6600 or higher to support real-time rendering and simulation.
5. SSD with 512GB or more for high-speed data access.

3.3. Design

The design process for visualizing the End Gondola Display (EGD) is carried out using 3D Prototyping-based digital technology. This approach aims to create an interactive visual representation that is realistic, efficient, and detailed. The visualization of the End Gondola Display to be created will be depicted as follows.

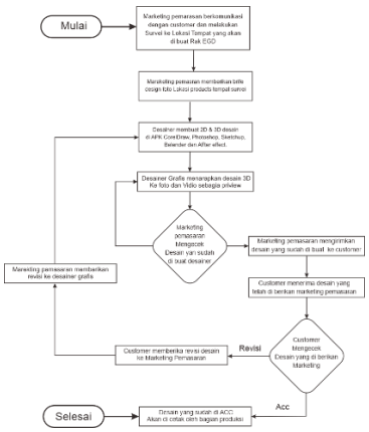

Fig. 1 : Flow Chart for making end gondola display racks

The shelf design concept refers to the layout of the End Gondola (EG) shelf elements used to optimally display products in a store. This design involves key elements such as the header, middle shelving, and base shelving, which are designed to provide both an aesthetic impression and maximum functionality in product display.The header section can be used to display a logo or tagline. products, while the shelving is designed with dimensions suitable for accommodating products in an organized manner and making them easily accessible to customers.

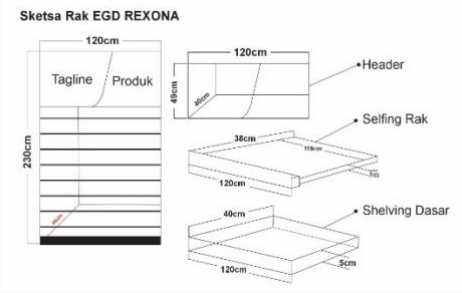

Fig. 2 : EGD Concept Design Shelves

A Header Sign is an information panel or board typically placed at the very top of a shelf, gondola, or product display. Its main function is to attract customers' attention and provide important information about the products or category displayed on the shelf.

Fig.3 : EGD Concept Design Shelves

A Call to Action (CTA) refers to an element in design, marketing, or communication intended to encourage the audience to take a specific action CTAs are used to direct attention and prompt the audience to take the next step in line with the communication or promotional objective.

Fig. 4 : *Design* 2D CTA (*Call to Action*)

CorelDRAW is a vector-based graphic design software used to create various types of visual works. With vector-based editing, images can be scaled up or down without losing quality. The software also supports various file formats, such as CDR, AI, PDF, EPS, SVG, and DWG, making it easier to integrate with other design software.

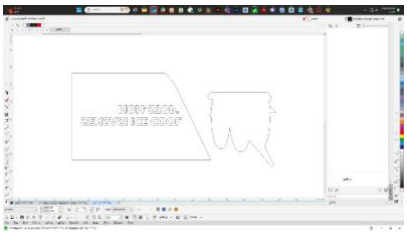

Fig. 5 : *Vector Tagline & Produk Rexona CorelDraw*

The material creation technique in SketchUp is carried out through the process of setting textures and visual properties to be applied to the surfaces of a 3D model. This process begins by opening the material panel in SketchUp, then creating a new material using the "Create Material" option.

Fig. 5 : *Color Texture Result*

Animation is a technique of displaying images or objects sequentially over a period of time to create the illusion of movement. Animation can be created in various forms, such as hand-drawn images, 3D models, or even physical objects photographed using the stop-motion technique.

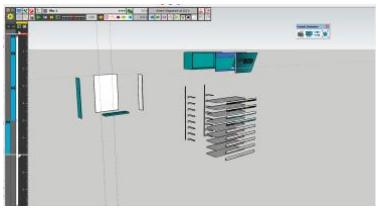

Fig. 6 : *Animation Creation*

To create animation in 3D, the author uses the Fredo Animator plugin, one of the most popular plugins in the SketchUp ecosystem, especially for users who want to add animation to their 3D models. Developed by Fredo6, this plugin allows users to create various types of animations by moving, rotating, and scaling objects gradually, thus producing more realistic and dynamic animation effects.

3.4. Implementation of Augmented Reality

The following explains the process and usage. The following explains the process and usage. In the implementation of Augmented Reality (AR) based on Unity, the system architecture can be divided nto three main components: Assets, Vuforia, and Engine. Each component plays an integrated role in building a complete AR experience. The following figure illustrates the relationship between these components.

1. Asset This component includes various visual elements to be displayed in AR. The two main elements in this category are:
    a. 3D Model – Three-dimensional objects that will be visualized in the real world through the camera.
    b. Image Target – A reference image used as a marker or trigger to display the 3D object in the AR application.
2. Vuforia is an AR development platform integrated with Unity. Its function is to link image targets with 3D objects. The components include:
    a. Package – The SDK package required to run AR functions in Unity.
    b. Database Image Target – A database containing a collection of image targets, which are then recognized by the device's camera to display virtual objects.
3. Engine This part is the core of the system, namely the application development platform:
    a. Unity – The game engine used to integrate all elements, from 3D models and image targets to application logic settings.
    b. Android SDK – A software development kit that enables Unity applications to be built and run on Android devices.

These three components must work together to ensure the AR application functions properly. Unity serves as the central controller, Vuforia acts as the visual recognition system, and Assets provide the displayed content. Thus, the entire system can seamlessly combine the real and digital worlds in real time and interactively.

3.5, Process Flow of Augmented Reality Implementation

Workflow of an AR System Integrating Unity 3D and Vuforia The AR system workflow that integrates Unity 3D and Vuforia begins with asset processing and ends with the rendering of a 3D object into the real world through an image target. The systematic steps are as follows:

1. Unity 3D Game Engine
   Unity acts as the main platform for building and running AR applications. It provides a visual programming environment to arrange and process all AR elements.
2. Import
   This process involves importing assets—such as 3D models and image targets—into Unity. These assets can be animals, products, buildings, or other visual elements to be visualized through AR technology.
3. Database Image Target (Vuforia)
   Imported image targets are processed and stored in Vuforia's dedicated database. This database stores the images that will later be recognized by the camera as triggers for displaying 3D objects.
4. Vuforia – Proces
   This component handles the detection process. When the device camera recognizes an image target from the real world, Vuforia matches it with the data in its database.

5. AR Visualization Output
Once detection is successful, the preconfigured 3D object is displayed precisely over the image target. In this illustration, the visualized object is a *Rexona* product appearing on top of a flat image.

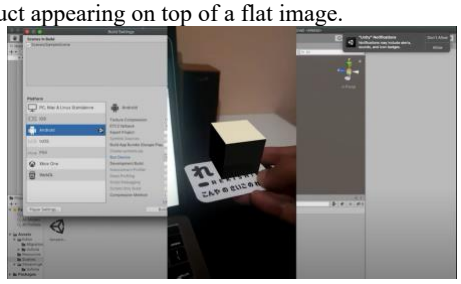

Fig. 7 : *Use of ar in box model by coba coding*

4. Result

The results of the design for the Visualization of the End Gondola Display (EGD) using the 3D Digital Prototyping method are explained as follows:

1. EGD size details

a. Overall size of EGD

The detailed EGD dimensions are the specifications that will be presented to the EGD production team. From height and width to the depth of the shelves, every detail will be provided to enhance the production team's understanding of the structure and function of the designed gondola rack.

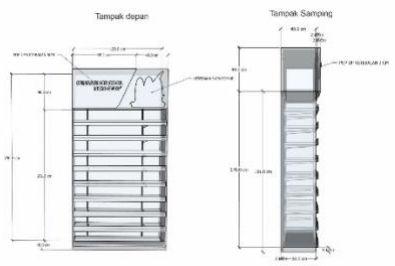

Fig. 8 : *Overall size of EGD*

b. Header size detail

The header on the End Gondola Display (EGD) serves as the main visual element that consumers notice first. It is designed with striking colors, bold typography, and clear, concise promotional information. Its primary function is to attract attention from a distance and direct the consumer's gaze toward the displayed products. With its strategic position at the very top of the rack, the header becomes an effective visual communication tool for conveying brand messages and promotional campaigns.

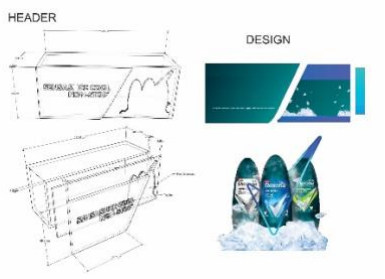

Fig. 9 : *Header detail image* Board size details

c. Header detail image

he left and right back panels are the main structural elements of the End Gondola Display (EGD) rack.These components serve as vertical supports that hold the entire frame and bear the load from the horizontal shelving installed between them. Without these panels, the rack's structure would lose its stability and be at risk of collapsing when used in a dynamic retail environment.

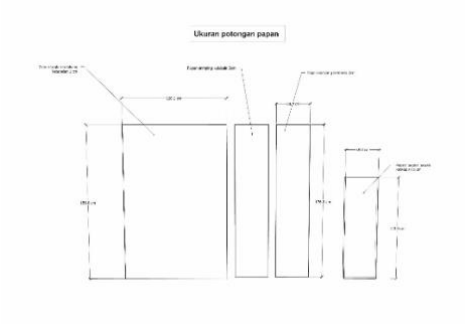

Fig.10 : *Header detail image*

d. Shelving rack size details and CTA (Call to Action)

The shelving rack is the main structure for product display, designed to be modular and precise according to specified dimensions. Each shelf is installed in parallel with optimal strength to support the product load. The CTA (Call to Action) is an additional visual element—usually a small panel at the front of the rack containing promotional prompts such as "Buy Now" or "Special Discount." The CTA design is made lightweight, easy to attach and remove, and visually striking.

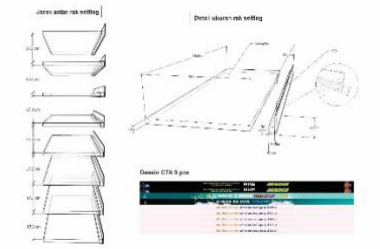

Fig. 11: *Shelving rack size details and CTA (Call to Action)*

e. Sketsa Vecktor

A vector sketch is a digital template or pattern based on lines and shapes (vectors) used to cut, print, or shape physical objects accurately. This vector sketch will be provided to the production section to make it easier to cut the 3D shelf shape.

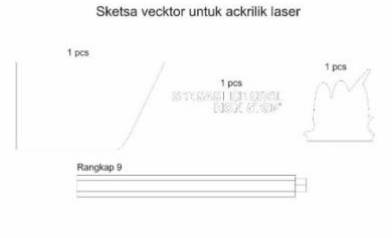

Fig. 12 : Sketsa Vecktor

2. Animation of EGD installation

The EGD installation animation is a visual medium in the form of a 3D video or motion graphic specifically designed to visualize the entire assembly process of the End Gondola Display rack step-by-step and systematically. This animation shows the sequence of installing components starting from the rack base, right and left support panels, shelving, brackets, and finally the header—presented with realistic and easy-to-understand visuals.

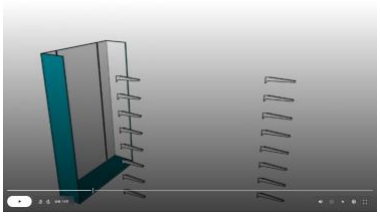

Fig. 13: *EGD animation*

3. Prototyping is made as follows:

a. making CTA

The CTA (Call to Action) section is made using acrylic as the main material. This material is chosen for its clear appearance, lightweight nature, and durability—making it capable of displaying promotional messages or purchase prompts clearly while attracting consumers' attention.

Fig. 14: *CTA creation*

b. Making shelving racks

The final shelving rack is the main component of the End Gondola Display (EGD) system, fully assembled and ready for product arrangement in retail areas. It is designed with careful consideration of functionality, strength, and aesthetics, enabling it to hold various types of merchandise while maintaining a neat and visually appealing display.

Fig.15 : Making Shelving Racks

c. Results of EGD installation

The EGD prototyping results are the initial representation of the designed product, both visually and functionally. This prototype is used to test the form, function, and design concept before mass production, allowing for early evaluation and improvement.

Fig. 16 : Results of EGD installation

The End Gondola Display (EGD) installation animation is created to simplify technical understanding of the assembly process. Through 3D visualization, users can clearly and efficiently observe the installation sequence.Augmented Reality (AR) technology is also utilized to provide an interactive experience,

allowing users to see the EGD object as if it were present in a real space. With the combination of animation and AR, the processes of communication and documentation become more effective, practical, and engaging.

5. Conclusion

The conclusions drawn by the author in this thesis design are as follows: In this thesis, 3D technology is optimized through the use of design software to create a precise and realistic visualization of the End Gondola Display (EGD). The use of digital prototyping is able to overcome obstacles in visualization and design communication, making the processes of revision, testing, and idea delivery more efficient and accurate. The 3D model not only clarifies the final appearance of the product from various angles but also enables comprehensive functional simulation before production, ensuring that the final result meets the requirements and serves its intended purpose effectively.

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References

[1] "House Model at Pramuka Garden Residence Housing," *J. Teknoinfo*, vol. 14, no. 2, p. 95, 2020, doi: 10.33365/jti.v14i2.654.
[2] I. Maula, R. Rohimah, K. Salsabila, and T. Azalia, "Redesign of Layout Planning at Ritel Lestari, Bogor City," vol. 1, no. 2, 2024.
[3] I. D. Gede, A. Mulyawan, H. A. Sutardi, and A. A. Jawani, "Analysis of the Meaning of Stereoflow Graphic Work in the Society 5.0 Era," *National Design Seminar*, vol. 1, no. 2017, pp. 1–6, 2021.
[4] E. A. S. Syaputra, W. Sartika, and O. F. Ngabito, "Effectiveness of 3D Visualization and Augmented Reality for Optimizing Information and Promotion Media of Jepara Wooden Furniture in the Online Market," *Compact Spatial Development Journal*, vol. 2, no. 1, pp. 47–55, 2023, doi: 10.35718/compact.v2i1.848.
[5] M. Masy'ari, E. Karyadi, and R. Rusadi, "Application of Digital Prototyping Techniques in the Design and Manufacturing of Generative Design-Based Product Models," *Turbo: Journal of Mechanical Engineering Study Program*, vol. 9, no. 1, 2020, doi: 10.24127/trb.v9i1.1171.
[6] N. Ruseno and S. Satria, "Use of 3D Landmarks for Mosque Recognition in Bekasi City Using the Prototype Method," *Kilat*, vol. 10, no. 1, pp. 22–31, 2021, doi: 10.33322/kilat.v10i1.612.
[7] D. Arisikam, A. Hermawan Purwadinata, A. Noor Ravi Adzanto, D. Prasarana, and Civil Engineering Study Program, "Development of 3D Visual Media for Heritage Station Using 3D SketchUp 2019 as BIM Implementation at DAOP 2 Bandung Station."
[8] S. Sundari, F. Damayanti, and A. Rafika Dewi, "Training on Making 3D Animation Using SketchUp at SMK Pantai Labu," *Journal of Community Service*, vol. 1, no. 2, pp. 91–100, 2024. [Online]. Available: https://ejournal.smart-scienti.com/index.php/Smart-Humanity
[9] S. Pokhrel, "Development of Mathematics Learning Media Based on Animated Video Using Adobe After Effects," *Αγαη*, vol. 15, no. 1, pp. 37–48, 2024.
[10] Siti Muntari, Elpita Aisah, and Fitria Rahmadaynti, "Training on Making Brochures Using Adobe Photoshop at SMA PGRI Pagar Alam," *Kreatif: Journal of Community Service in the Archipelago*, vol. 3, no. 2, pp. 174–179, 2023, doi: 10.55606/kreatif.v3i2.1752.
[11] L. Refnitasari, H. W. Cahyaka, N. Frida D.B.P., and M. Imaduddin, "Graphic Design Training Using CorelDRAW as an Additional Skill for Students of SMK Negeri 7 Surabaya," *JPP IPTEK (Journal of Community Service and Application of Science and Technology)*, vol. 7, no. 1, pp. 25–34, 2023, doi: 10.31284/j.jpp-iptek.2023.v7i1.3763.
[12] H. Reygita et al., "Utilization of Google as an Online Learning Resource for Social Studies Subjects in Elementary Schools," *J. Pendidik. Tambusai*, vol. 6, no. 1, pp. 4346–4350, 2022.