

Modular Course C: Design Engineering

UNIT C1: Digital Design and Engineering Tools

LC1.1 – Computer Aided Design tools (CAD) in
L&F sectors



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DISHOLEA | Improving the digital
skills of workforce in Shoe and
Leather goods Industry in Jordan and
Palestine | GA 101129194



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- Computer-Aided Design (CAD) refers to the software technologies used to create, modify, analyze, and optimize a design in a computer environment.



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Main Objectives

- To increase the efficiency of the designer.
- To improve the design quality.
- Improving communication through documentation.
- To create a solid technical data infrastructure for production.



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Main application areas

Upper, Base and Last Design:

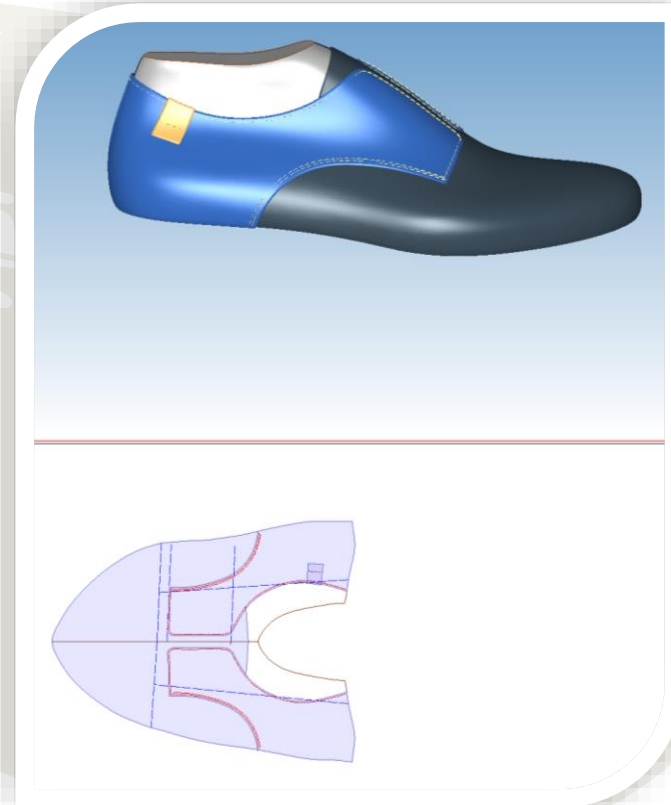
Designers can model upper parts in 3D on a digital shoe last and easily create complex geometries such as soles and heels.



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Main application areas

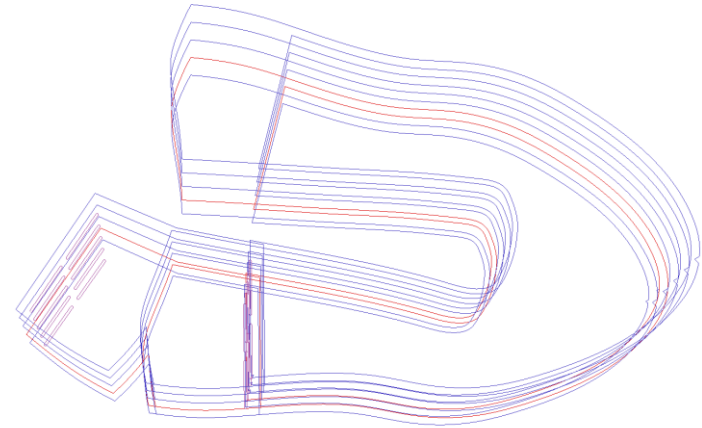
Stamp: It can be worked in 2b and 3d. This method offers significant advantages in terms of both time and precision compared to traditional manual last removal methods.



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Main application areas

Grading: Parts of a model can be adapted to the entire series for different numbers quickly and error-free thanks to CAD software.



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Main application areas

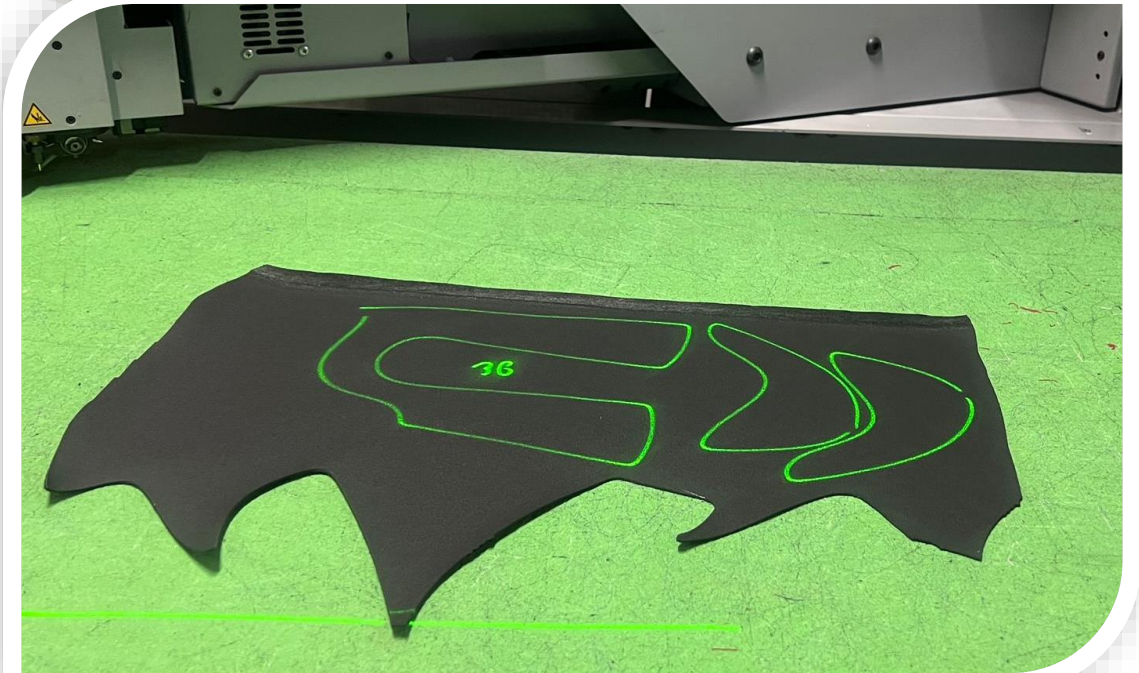
Digital Prototyping and Visualization: Photo-realistic digital prototypes are created by adding realistic material textures, colors, and props to designs.



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Integration with Manufacturing (CAD/CAM)

Computerized Cutting machines: 2D drawings from CAD are cut directly on cutting machines to cut materials such as leather and textiles with high precision and minimal wastage.



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Integration with Manufacturing (CAD/CAM)

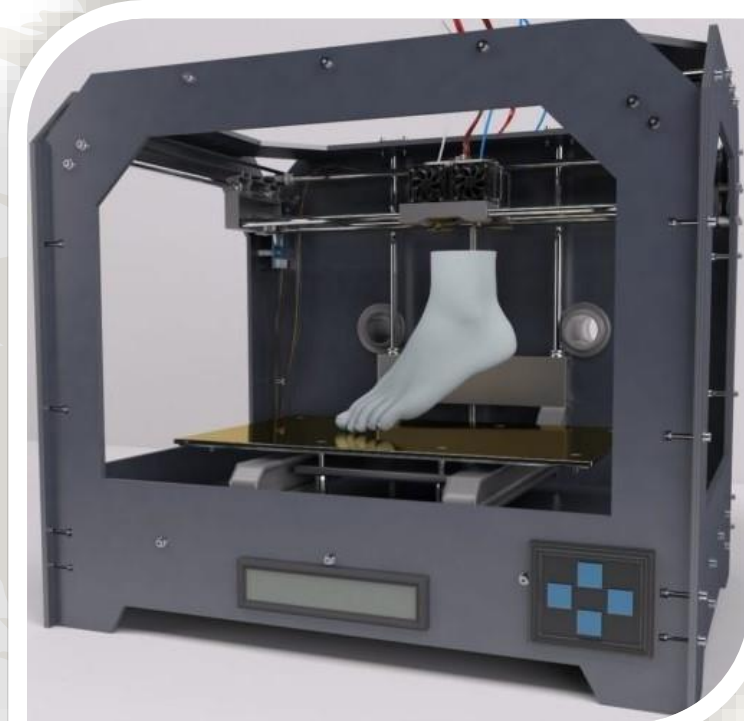
CNC Milling: Complex 3D parts such as shoe soles, heels, or lasts are machined with millimeter precision on CNC machines using data from CAD models. This ensures standardization and repeatability, especially in last production.



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Integration with Manufacturing (CAD/CAM)

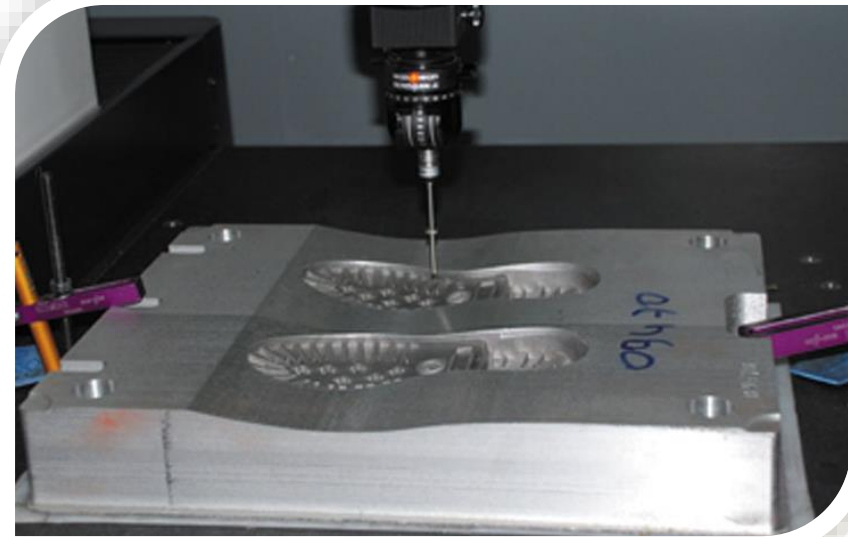
3D Printing: This technology not only dramatically speeds up the prototyping process but also offers flexible and innovative solutions by eliminating last costs in customized production.



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Integration with Manufacturing (CAD/CAM)

- **Injection** **Lasting:**
Injection lasts required for mass production of plastic or rubber soles are designed in CAD and manufactured by CNC, ensuring standardization.



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Data Formats

Formats such as DXF for 2D last drawings and 3DM (Rhino), STL/OBJ (for 3D printing and visualization), and STEP/IGES (for data exchange between different CAD platforms) are commonly used in the industry. These standards ensure compatibility between different stakeholders in the supply chain.



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Data

(PDM/PLM) :

Numerous revisions are made during the development process of a shoe model, such as pattern corrections, material changes, and color variations. PDM (Product Data Management) or PLM (Product Lifecycle Management) systems keep these revisions under control.

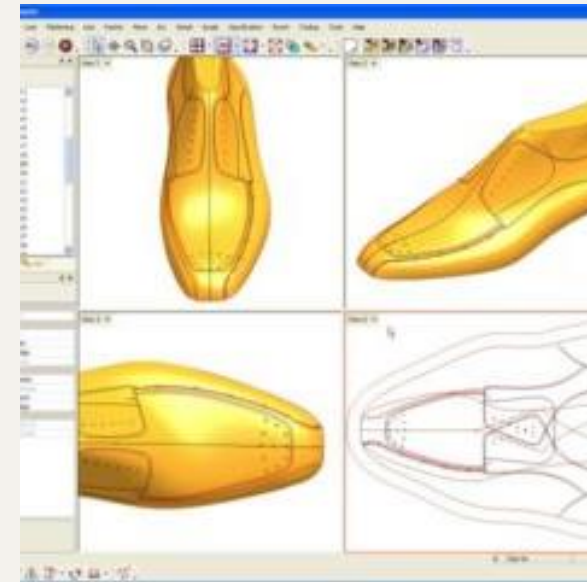
Management

Numerous



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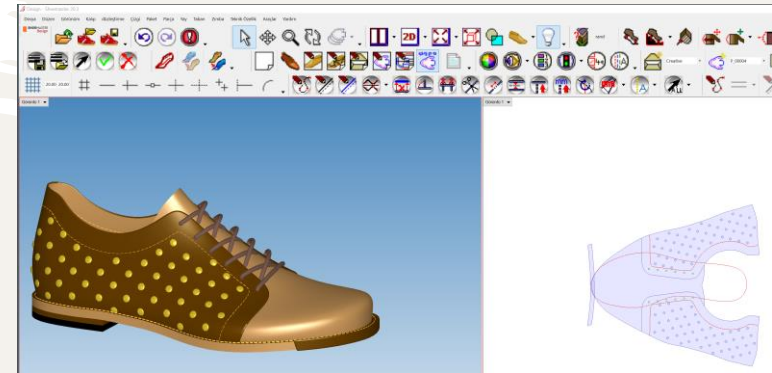
- In the leather and footwear industry, both specialized industrial **CAD solutions** and **general-purpose 3D design software** are used.



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Common CAD Software and Features in the Industry

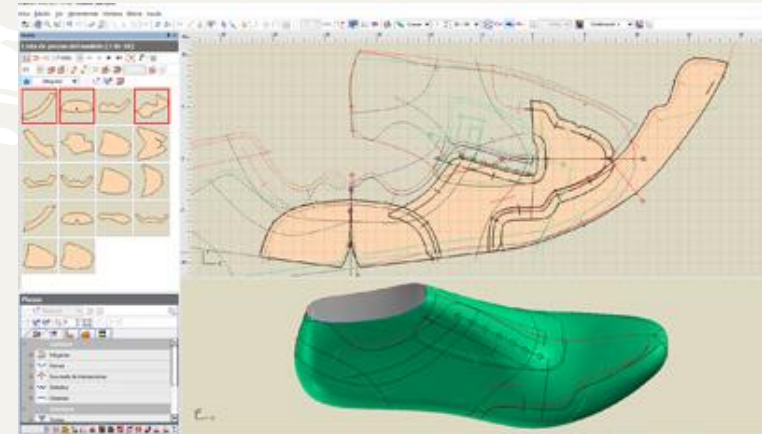
- **Shoemaster:** It is a user-friendly program developed specifically for shoe design. With its 2D and 3D modes, it offers practical solutions, especially for last preparation and model diversification.



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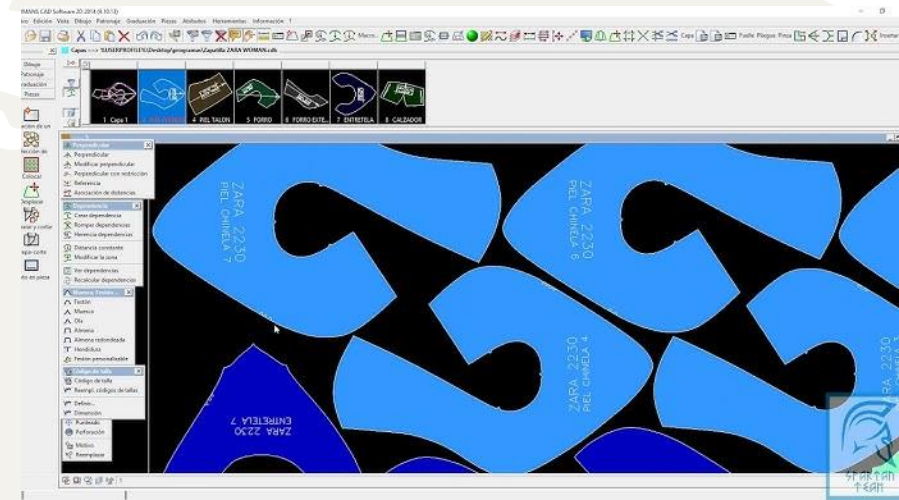
- **ICad3D+:** It combines 2D last engineering and 3D design. It allows precise dimensioning and integrated design of different parts.



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Common CAD Software and Features in the Industry

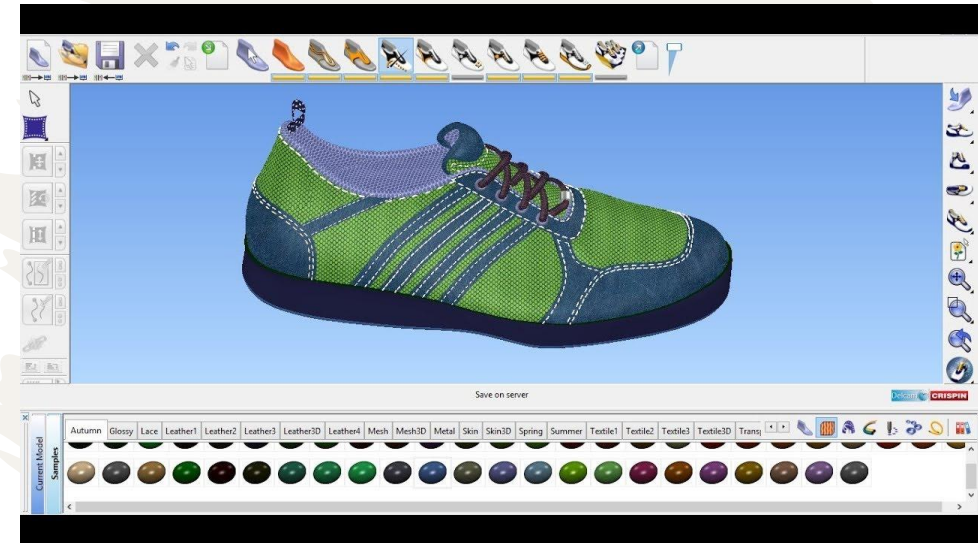
- **Romans CAD:** It is a cloud-based platform. It is effective in 3D prototyping and allows designers and manufacturing teams to collaborate simultaneously.



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Common CAD Software and Features in the Industry

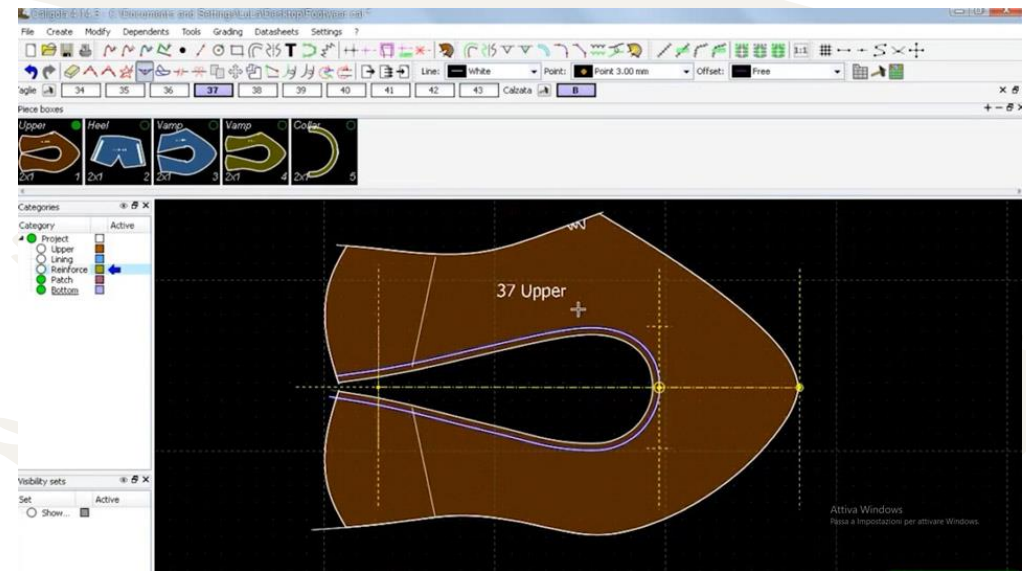
- **Delcam Crispin (Autodesk)**: It is a comprehensive CAD/CAM package that has been used for many years. It is used in last modeling, upper drawing and base design. Today, it integrates with Fusion 360 and offers production and simulation features



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Common CAD Software and Features in the Industry

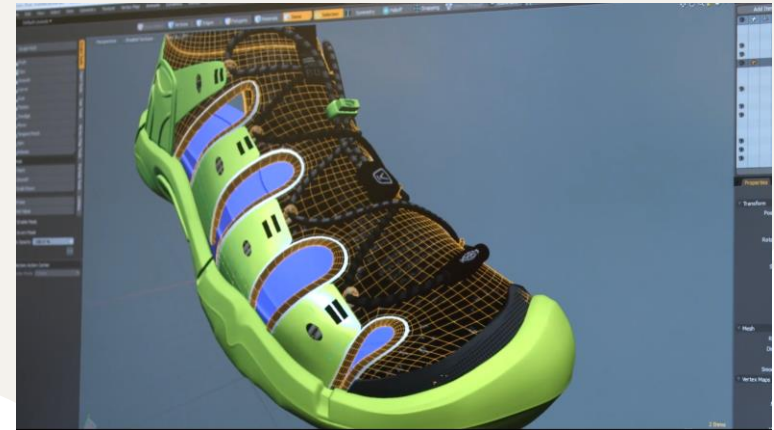
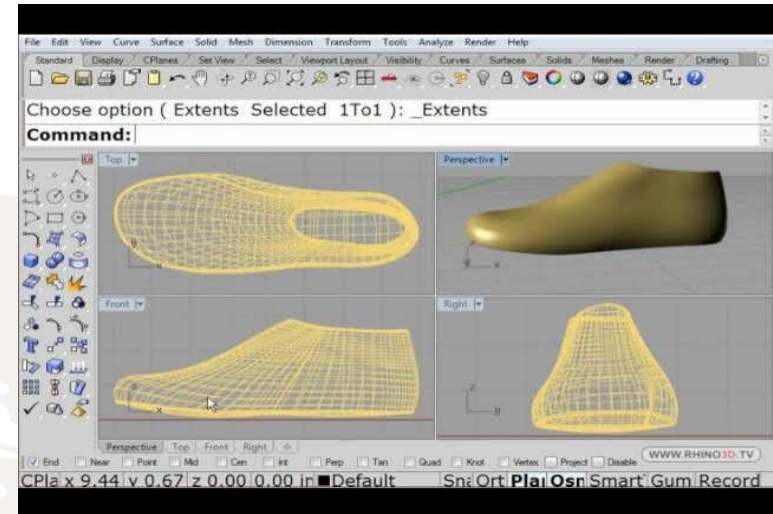
- **Comelz Caligola:** It is a shoe and leather goods design and tooling software. Extremely easy to learn and use, Caligola 4 can run on almost any computer system.



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General 3D Modeling Software

Some designers use industrial design and digital sculpting software such as **Maya**, **Modo**, **Rhino**, **ZBrush** to create the shoe form and develop concept details.



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General 3D Modeling Software

With **ZBrush**, organic shapes and reliefs can be designed on the base or top surface and then transferred to the technical CAD environment.

Modern CAD tools like **Fusion 360** also appeal to a wide range of users with their cloud-based operation, parametric modeling, and visualization advantages.



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Future Perspective

In the future, CAD systems will be further integrated with artificial intelligence (AI), AR, VR technologies. AI-powered CAD platforms will be able to suggest alternative shoe forms based on the aesthetic parameters chosen by the designer; With AR integration, virtual trials can be made in digital showrooms.

This transformation brings the **L&F sector into the era of "digital craftsmanship"**.

