

Modular Course D: Customization Engineering

Unit D3 – 3D Printing Applications in the Leather & Footwear Industry

Lecture D3.3 – Printing of Soles and Heels



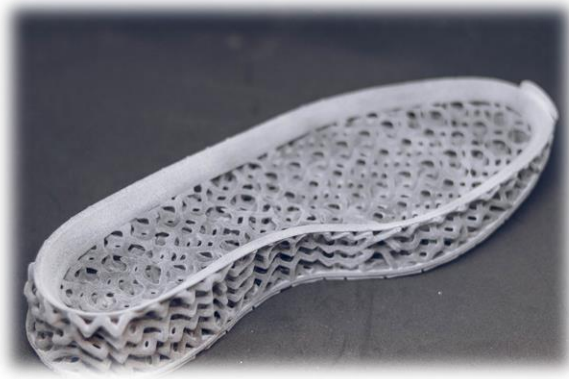
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T2.2 – Development of modular courses and
training material.

D2.4 – Modular Course in Customization
Engineering



Lesson D3.3 – Printing of Soles and Heels

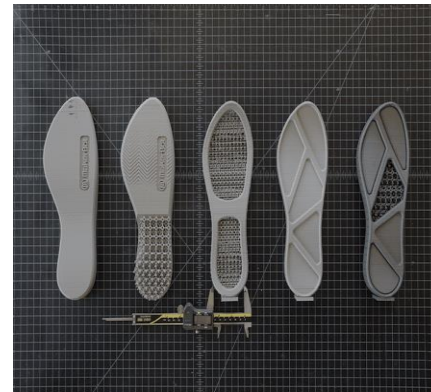
3D Printing Applications in the
Leather & Footwear Industry

1. Introduction

- 3D printing is transforming footwear manufacturing
- Enables customized soles and heels for performance, comfort, and style
- Benefits:
 - Complex geometries
 - Lightweight structures
 - Personalized cushioning
 - Sustainable production

2.1 Workflow – Soles

1. Foot Scanning & Biomechanical Analysis
2. Digital Design (CAD Modeling)
3. Material Selection (TPU, EVA, Nylon)
4. Printing Process (SLS, FDM, PolyJet)
5. Post-Processing (Cleaning, finishing, coating)



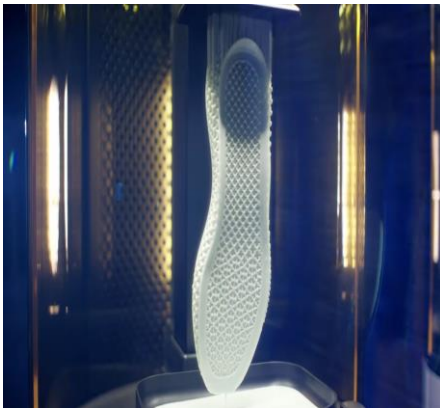
2.2 Advantages of 3D Printed Soles

- Customized comfort & ergonomic fit
- Lightweight and durable
- Rapid prototyping for fast iterations
- Sustainable with reduced material waste



2.3 Challenges in Printing Soles

- Limited scalability due to costs & print times
- Material performance limitations
- Biomechanical testing requirements
- Integration with traditional shoe-making



3.1 Workflow – Heels

1. Design & Aesthetic Customization
2. Material Use (Nylon composites, resins)
3. Printing Methods (SLA, PolyJet)
4. Reinforcement & Finishing



3.2 Applications of Printed Heels

- High-fashion bespoke heels
- Orthopedic applications for foot health
- Sustainable design concepts
- Decorative and luxury customization



4. Case Studies

- Adidas Futurecraft 4D – Lattice midsoles with DLS
- ECCO Quant-U – Data-driven custom silicone midsoles
- Under Armour Architech – Early lattice midsole adoption



5. Discussion Questions

1. What advantages does 3D printing offer over traditional molding?
2. How does it contribute to sustainability?
3. What are the key barriers to large-scale adoption?
4. How can hybrid approaches (3D be used?



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D3.4 – 3D Printing for Leather Goods



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T2.2 – Development of modular courses and
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Lesson D3.4 – 3D Printing for Leather Goods



mization and Innovation in
Leather Products



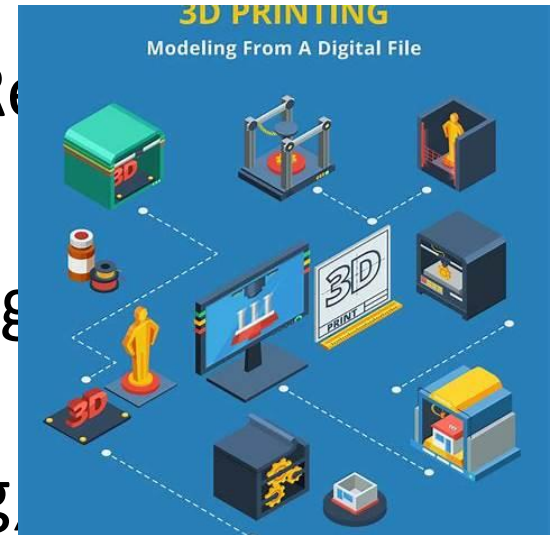
1. Introduction

- 3D printing transforms leather goods industry
- Enables customization, sustainability, and innovative design
- Combines traditional craftsmanship with



2. Workflow for 3D-Printed Leather Goods

1. Customer-Centered Customization (3D scanning, personalization)
2. Digital Design (CAD modeling of parts & ornaments)
3. Material Selection (TPU, Nylon, Resin)
4. Printing Process (SLA, FDM, SLS)
5. Integration with Leather (stitching, leather embedding)
6. Post-Processing (painting, plating)



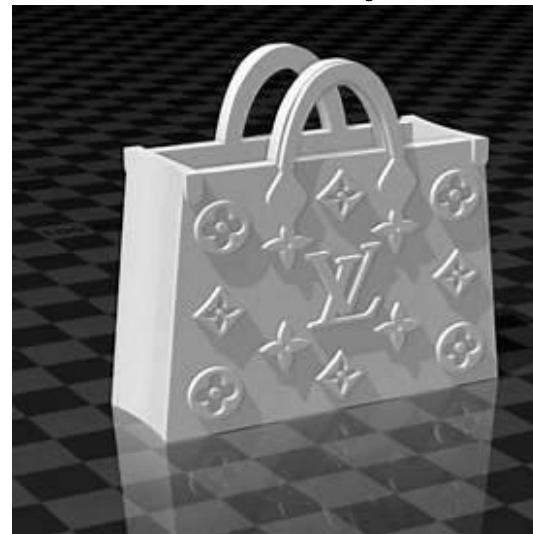
3. Applications of 3D Printing in Leather Goods

- Fashion Accessories: buckles, fasteners, ornaments
- Luxury Goods: custom panels, monograms, handles
- Functional Enhancements: lightweight structures
- Sustainable Components: repairable



4. Case Studies

- Louis Vuitton x Stratasys – experimental handbags
- Iris van Herpen – fashion with 3D embellishments
- Startups – custom buckles, wallet parts, panels



5. Advantages

- Personalization at scale
- Waste reduction and sustainability
- Creative freedom in design
- Faster prototyping and iteration

6. Challenges

- Material compatibility with leather
- Durability of printed components
- High production costs
- Need for skilled craftsmanship in hybrid



7. Discussion Questions

1. How does 3D printing change luxury leather goods?
2. How can artisans adopt 3D printing?
3. How does it support sustainability?
4. What new designs are possible with hybrid leather goods?