

Modular Course D. Customization Engineering

Unit D1: Customization in the Leather & Footwear Sector

Lecture D1.4 – Best Practices



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

D2.4 – Modular Course in
Customization Engineering



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Introduction

- ❖ Importance of high-quality leather footwear
- ❖ Key considerations: leather choice, design, pattern-making, cutting, assembly, lasting, finishing
- ❖ Emphasis on craftsmanship, precision, durability

Leather and Shoe Design

- ❖ Leather as a by-product of meat industry
- ❖ Environmental concerns: water, chemicals, energy
- ❖ Sustainability pillars: environmental, economic, social

Conventional Leather Manufacturing Process

- ❖ Pre-tanning: soaking, unhairing, liming, deliming, bating
- ❖ Tanning: chrome tanning (80–90%)
- ❖ Post-tanning: softening, colouring
- ❖ Finishing: coatings, final look

Environmental Impacts

- ❖ Wastewater: high TDS, BOD, COD, chemicals
- ❖ Solid waste: 637 kg/ton hides, chromium content
- ❖ Air emissions: H₂S, ammonia, VOCs, dust

Best Available Technologies (BATs)

- ❖ Definition & goals
- ❖ Criteria: water reduction, chemical efficiency, waste management, energy savings
- ❖ Holistic assessment to prevent burden shifting

Cleaner Leather Manufacturing Solutions

- ❖ Preservation: chilling, organic preservation-cum-unhairing
- ❖ Unhairing: hair-save techniques, enzymatic methods, CO₂ deliming
- ❖ Tanning: chrome recycling, zero-water chrome tanning
- ❖ Post-tanning & finishing: natural dyes, water-based finishing, solid waste valorization

Futuristic Technologies

- ❖ Integration of multiple BATs
- ❖ Waterless/low-water processes
- ❖ Salt-free preservation, enzymatic unhairing, chrome-free tanning
- ❖ 60–70% water use reduction, reduced pollution, faster processing

Best Practices Overview

- ❖ Process Optimization: Lean & Agile Manufacturing
- ❖ Quality Control: Fit testing, material testing, feedback systems
- ❖ Customer Experience: Co-creation, transparency, after-sales
- ❖ Sustainability Focus: Eco-friendly materials, ethical standards

Sustainability Practices

- ❖ Materials: vegetable-tanned leather, bio-leathers (Piñatex, Mylo)
- ❖ Water Conservation: closed-loop systems, 50% reduction
- ❖ Energy: solar, efficient machinery
- ❖ Waste: scraps reused, digital cutting
- ❖ Ethical labor: fair wages, safe working conditions
- ❖ End-of-Life: take-back programs, circular design

Best Practices in Customization Workflow

- ❖ Recap of process optimization, quality control, customer experience, sustainability
- ❖ Emphasis on personalization, reduced environmental impact

Why Good Leather & Shoe Design Matters

- ❖ Eco-friendly & sustainable materials
- ❖ Customization & personalization via 3D printing
- ❖ AR/VR technology for visualization
- ❖ Automation & robotics for cutting & stitching
- ❖ Smart shoes: sensors, feedback systems
- ❖ Sustainable packaging
- ❖ Collaborations & partnerships