LEATHER NATURALLY

MODERN COW LEATHER PROCESSING – Version 1.1

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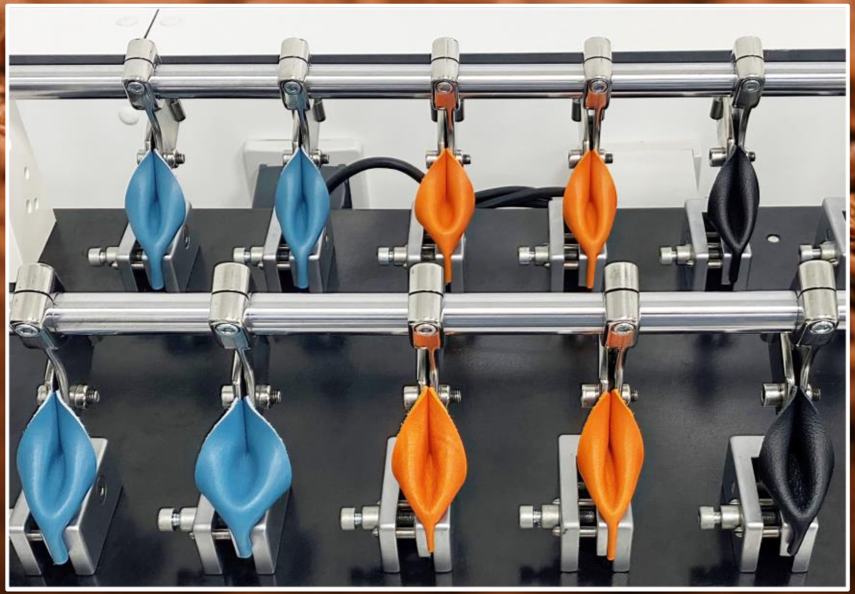
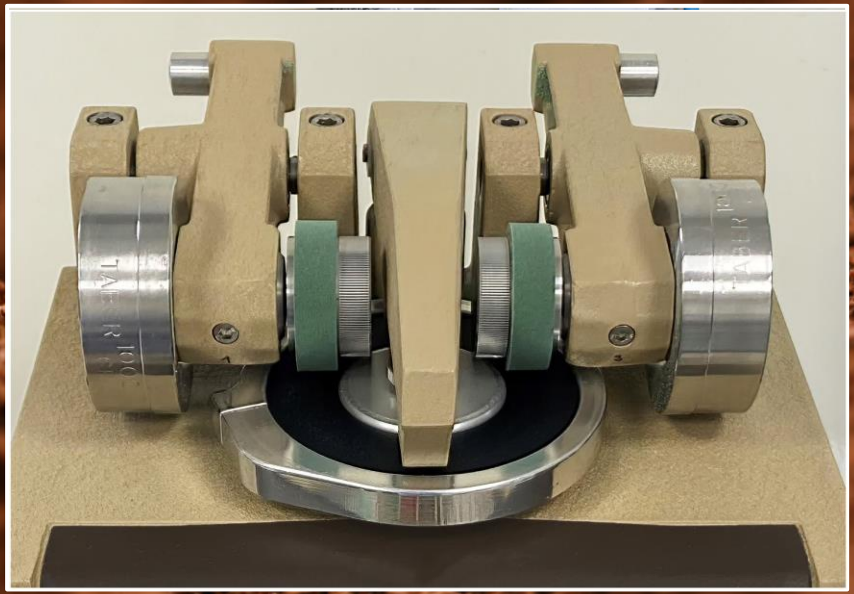
CURRENT INTERNATIONAL STANDARDS
for leather testing

- **The IULTCS** (International Union of Leather Technologists and Chemists Societies) has a special **agreement with ISO** (International Organization for Standardization) which means that there are **special ISO Standards** unique to leather testing that take into consideration all the material's properties. ISO **recognizes IULTCS as the international standardizing organization** for leather test methods.
- Leather test methods.
- ISO Standards are adopted globally as the **basis for local national standards.**
- **Almost 100 leather specific procedures** have been developed and approved as ISO Standards.
- **Examples include standards** for measuring area, tensile and tear strength, dimensional shrinkage, heat resistance, water repellence, fogging, flame resistance and color fastness, **as well as a range of chemical tests** for leather.
- **The list of leather test methods** can be found at https://iultcs.org/wp-content/uploads/2020/10/IULTCS-ISO-EN_Leather_test_methods_Oct-2020.pdf
- **The international methods developed by ISO and IULTCS** are available at https://www.iso.org/store.html . **Other national standards are ASTM** in the United States https://www.astm.org/ **and DIN** in Germany https://www.din.de/en/about-standards/buy-standards .

CURRENT INTERNATIONAL STANDARDS
for leather testing – continued



Flexing Resistance Test



Taber® Abrasion Test

CURRENT INTERNATIONAL STANDARDS
– basic leather physical and fastness testing

- **Identification of leather with microscopy** (ISO 17131 / IUP 56)
- **Thickness** (ISO 2589 / IUP 4), **surface coating thickness** (ISO 17186 / IUP 41)
- **Tensile strength** (ISO 3376 / IUP 6)
- **Shrinkage temperature** (ISO 3380 / IUP 16)
- **Water vapor permeability** (ISO 14268 / IUP 15)
- **Water absorption** (ISO 2417 / IUP 7)
- **Water resistance – Penetrometer** (ISO 5403-1 / IUP 10-1) **& Maeser** (ISO 5403-2 / IUP 10-2)
- **Tear load – single edge** (ISO 3377-1 / IUP 40), **– double edge** (ISO 3377-2 / IUP 8)
- **Stitch tear resistance** (ISO 23910 / IUP 44)
- **Dimensional change** (ISO 17130 / IUP 55)
- **Abrasion resistance** (ISO 17076-1 & 17076-2 / IUP 48-1 & 48-2)
- **Flex resistance** (ISO 5402-1 / IUP 20-1)
- **Soiling resistance** (ISO 26082-1 / IUP 53)
- **Surface area measurement** (ISO 19076 / IUP 58)
- **Fogging** (ISO 17071 / IUP 46)

BASIC LEATHER CHEMICAL ANALYSIS

- **Moisture** (ISO 4684 / IUC 5), **expressed as %. Typical values are 12 to 14%**
- **pH** (ISO 4045 / IUC 11), **expressed in units – for wet blue, 3.6-3.8; for crust leathers, above 5.0**
- **Chrome content** (ISO 5398 Parts 1 to 4 / IUC 8), **expressed in % Cr_2O_3** (from 0% for chrome-free leathers, others up to 4.0%)
- **Ash content** (ISO 4047 / IUC 7)
- **Fats and oils** (ISO 4048 / IUC 4) **– materials extractable by dichloromethane: typical values are between 5 to 20%**
- **Critical chemicals in leather** (ISO 20137 / IUC 36)

MAIN UNITS
in the leather industry

MATERIAL	MAIN PARAMETERS THAT DEFINE THE QUALITY AND PRICE	UNITS (HOW IT IS SOLD)
Raw hide	Type*, size, grade, origin**, weight range, curing method***	Piece, weight (lb. or kg), ft^2, m^2
Wet blue	Type*, size, grade, thickness	Piece, ft^2, m^2
Crust	Grade, thickness, color	ft^2, m^2
Finished	Grade, finish type, thickness, color, cutting area	ft^2, m^2

* Type: eg, native cow, branded cow, heifer, steer, Texas steer, bull, etc
** Origin: geographic location (also local)
*** Curing method: cold, ice, brine or salting

CONVERSION UNITS	
1 ft^2	0.0929 m^2
10.764 ft^2	**1 m^2**

CONVERSION UNITS	
1 lb.	0.4536 kg
2.2046 lb.	**1 kg**

TYPICAL BIODEGRADABILITY TESTS
for leather and synthetics

EN ISO 20200:2015

PLASTICS

- Determination of the degree of disintegration of plastic materials
- Test lasts between three and six months

EN ISO 20136:2020

LEATHER

- Determination of degradability by micro-organisms
- Test lasts one month and monitors CO_2 release

Ecotox testing

- Determination of toxin levels in leather-containing compost
- Four months

Plant response test

- Assessment of plant growth in leather- or chemical-containing compost
- Four months

LEATHER BIODEGRADABILITY

- **All leather is biodegradable/degradable.** For example, very few ancient Egyptian, Chinese, Indian, Greek and Mesopotamian leathers have survived from antiquity
- **The breakdown time varies –** with a commonly quoted time 0.05 to 45 years
- **Type and degree** of tannage, re-tannage, finish composition and thickness **affect leather's biodegradability**
- **The tannage order of biodegradability:** vegetable (least) < chromium < wet white < *chamois* (most biodegradable)
- **New biodegradability studies** are being carried out now and, in a few months, we will have more data

TABLE OF ESTIMATED BIODEGRADABILITY*

Material	Time in Years	Material	Time in Years
PVC	Forever	**Acrylic**	10 to 100
Polystyrene	+ 1,000	**Leather**	0.05 to 45
Polypropylene	+ 1,000	**Paper**	2 to 5 months
PE Low density	100 to 1,000	**Cotton**	1 to 5 months
Polycarbonate	100 to 500	**Banana peel**	10 days
Polyester and PU	20 to 200		

***** This is an estimate only. There are numerous variables in the materials and the conditions of biodegradability which are not directly comparable.

LEATHER REPAIR AND REDRESSING

Repairability is one of leather's best qualities.

Leather articles can be rejuvenated at home with the simple use of consumer polishes, stains, waxes and oils. Even waterproofness can be restored with consumer grade products. Professional repair work is available all over the world when any mechanical damage to a leather item needs doing. Here are some examples of before and after:

CHEMICAL MANAGEMENT
in leather manufacture

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MANAGING CHEMICAL INPUT

Leather is made by tanning animal hides using water and chemicals (eg, salts, acids, tannins, dyes, oils, finishing products, processing auxiliaries, etc). Chemicals are present in leather and its by-products (fat, proteins and salts) as well as in wastewater and gaseous emissions, so the right selection of chemicals is important and requires reliable, fact- and science-based toxicological and eco-toxicological information. Using the latest information for product selection, risks for workers, consumers and the environment can be minimized.

The use of chemicals in leather manufacturing is highly regulated and controlled. Many governments and brands have imposed strict chemical compliance regulations on manufacturers. One of the most prominent legislations is the EU REACh directive, which governs the manufacture and importation of chemicals in the EU.

An example of an influential non-governmental regulation body is the ZDHC Foundation https://www.roadmaptozero.com/ **. The ZDHC Road to Zero program is supported by more than 120 global brands, manufacturers, testing institutes and suppliers, and periodically issues an updated MRSL** (Manufacturing Restricted Substance List) aimed at restricting the use of chemicals to be used intentionally in chemical formulations in the leather and textile manufacturing supply chain. The MRSLs inform the chemical manufacturers on maximum allowable levels of specific substances present in a formulation.

Finished leathers must comply to the customer's chemical restricted list, called RSL.

Another example of **influential non-governmental regulation body is OEKO-TEX®** https://www.oeko-tex.com/

CHEMICAL HANDLING
in the leather industry

ANY CHEMICAL SUBSTANCE,

be it synthetic or natural, requires strict handling procedures to be observed. This starts with **monitoring** and **record keeping of chemical inventories**, **storage of chemicals** (temperature, humidity, separation of reactive chemicals, etc) and **training of workers and operators** on chemicals handling and personal protective equipment. We have seen examples on the internet showing pictures of workers handling (leather) chemicals in unsafe conditions and not using any personal protective equipment. Those situations are the exception, and most brands and manufacturers require tanneries to pass third party environmental stewardship audits which define good standards for operational safety and chemical handling.

Responsible chemical manufacturers also conduct special training for workers and operators where general and specific chemical know-how is provided. Furthermore, UNIDO, EU (BAT – Best Available Technology document) have **prepared excellent guidance documents for safe and responsible leather manufacturing.**

BEST ENVIRONMENTAL PRACTICES
for tannery effluent treatment

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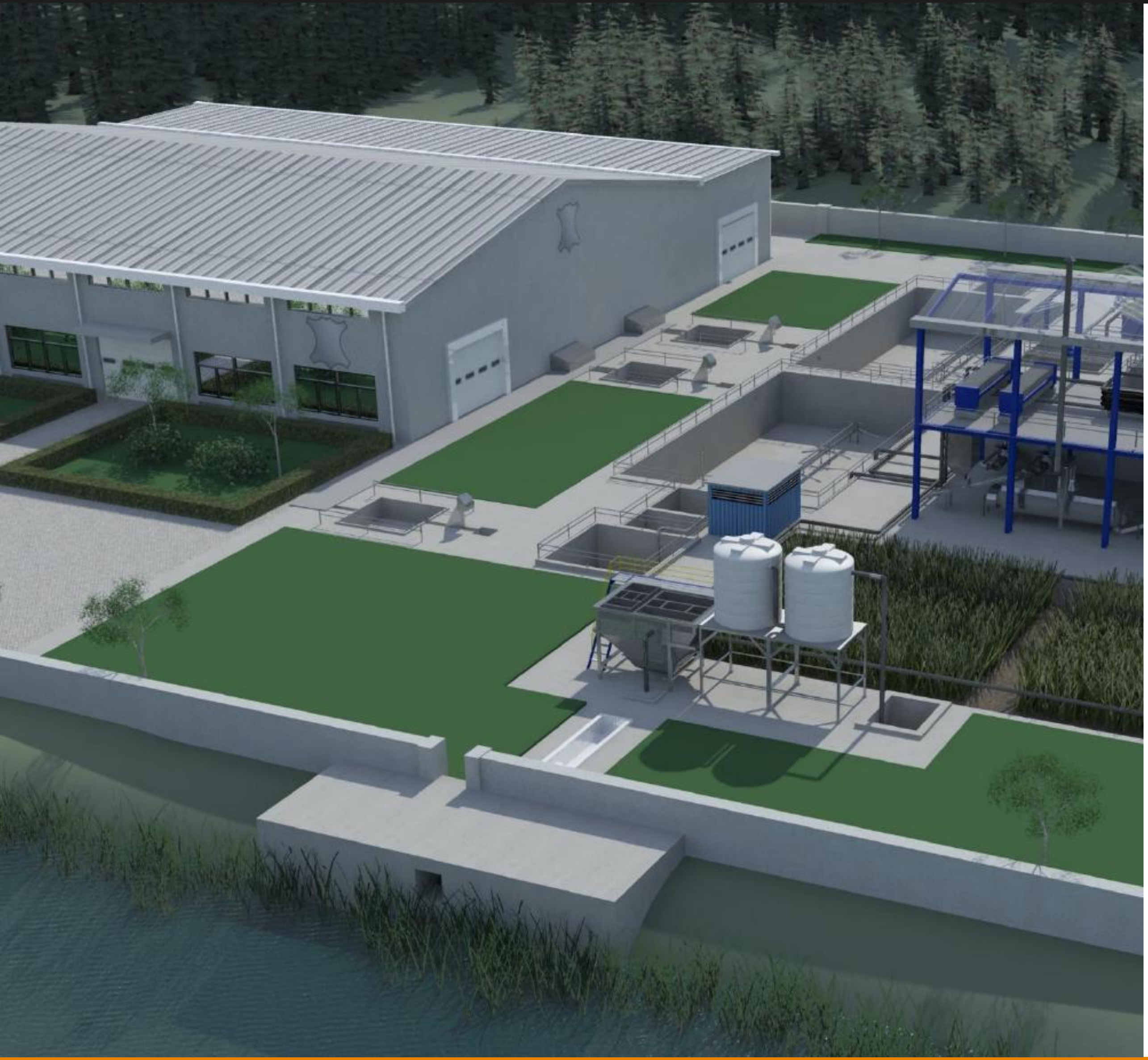

Tannery wastewater is a complex mixture of organic substances derived from the hide and organic and inorganic substances which are added during leather processing. The challenge for tanneries is to **reduce environmental impacts by:**

improving chemical uptake	**reducing** chemical and water use	**Increasing** efficiency of treatments
recycling process chemicals and water	**reducing** energy requirements	**reducing** emissions and sludge generation

Tanneries worldwide are continuously improving their environmental performance and are modernizing their effluent treatment plants to fulfil consumer demand, to achieve strict new norms and regulations and to continuously improve their environmental situation and sustainability.

Key current environmental technologies applied by tanneries are shown on the IUE webpage:

https://iultcs.org/tannery-effluent-treatment-videos

KEY TECHNOLOGIES
for tannery effluent treatment

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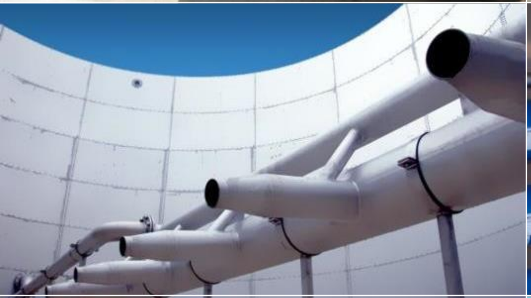


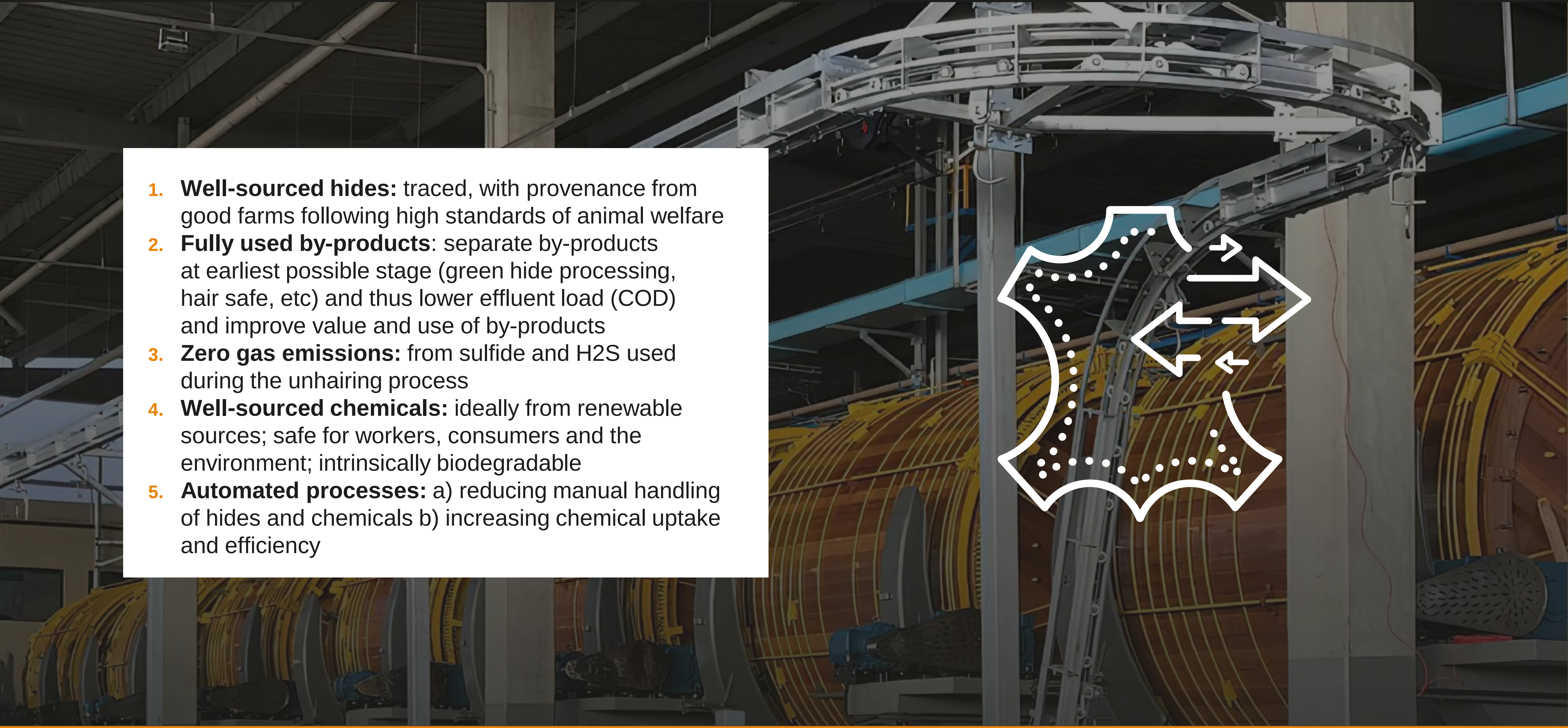

Key technologies for tannery effluent treatment

- Effluent segregation of chrome and sulfide-bearing liquors to recover chrome and oxidize sulfides
- Fine screening to reduce solids and aerated balancing to neutralize and reduce odors
- Primary treatment with dissolved air flotation to efficiently remove suspended solids and non-biodegradable COD
- Biological treatment with denitrification and nitrification to remove ammonia and total nitrogen
- Membrane bioreactor to remove micro-pollutants
- Nano filtration for water recycling
- Sludge de-watering to reduce sludge volumes and disposal costs

Sustainable solutions to reduce carbon footprint

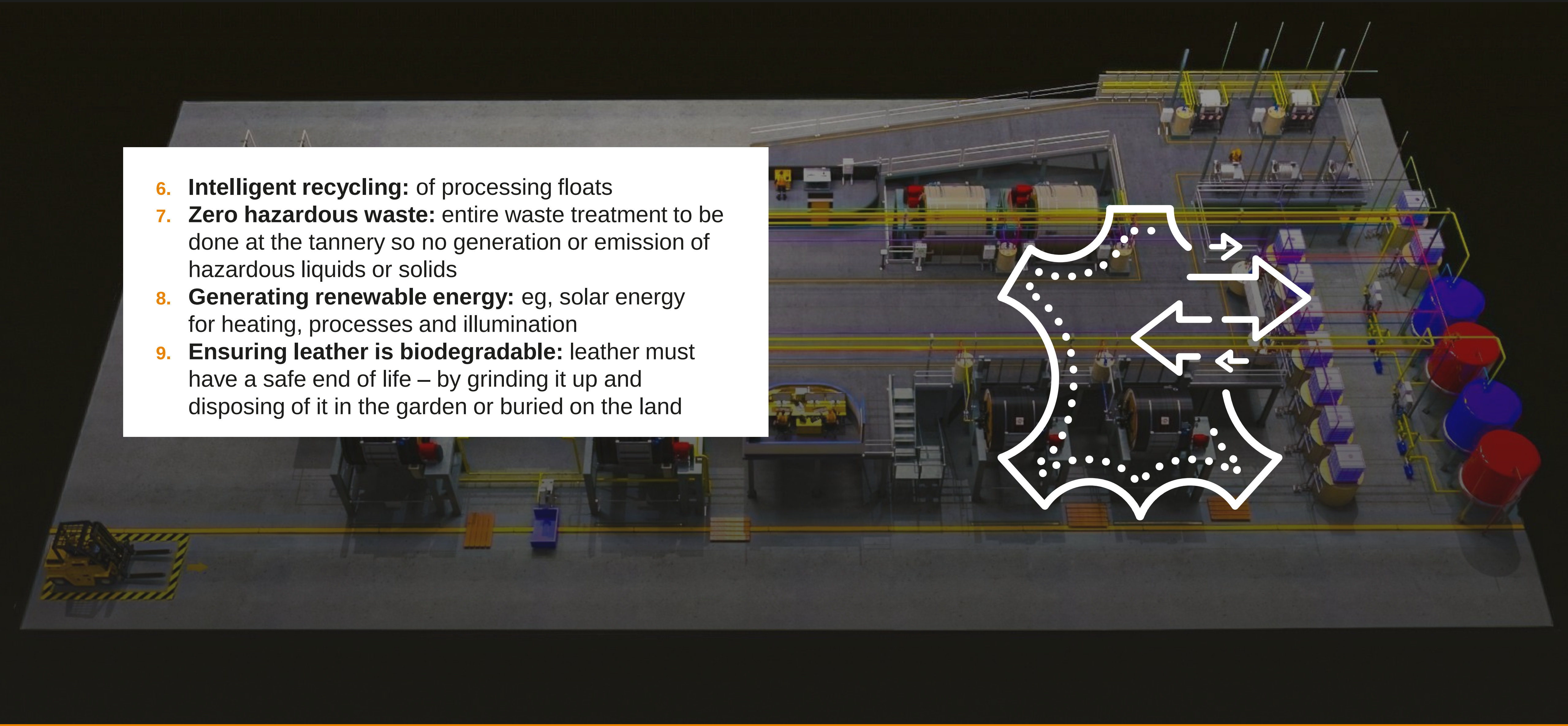
- Reed beds for tertiary treatment
- By-product utilization: recovery of chrome, gelatin, tallow
- Waste to energy: biogas, gasification
- Solar power water heater
- Rainwater collection

WHAT WILL COW HIDE TANNERIES BE LIKE IN THE FUTURE?



1. **Well-sourced hides:** traced, with provenance from good farms following high standards of animal welfare
2. **Fully used by-products**: separate by-products at earliest possible stage (green hide processing, hair safe, etc) and thus lower effluent load (COD) and improve value and use of by-products
3. **Zero gas emissions:** from sulfide and H2S used during the unhairing process
4. **Well-sourced chemicals:** ideally from renewable sources; safe for workers, consumers and the environment; intrinsically biodegradable
5. **Automated processes:** a) reducing manual handling of hides and chemicals b) increasing chemical uptake and efficiency

WHAT WILL COW HIDE TANNERIES BE LIKE IN THE FUTURE?



6. **Intelligent recycling:** of processing floats
7. **Zero hazardous waste:** entire waste treatment to be done at the tannery so no generation or emission of hazardous liquids or solids
8. **Generating renewable energy:** eg, solar energy for heating, processes and illumination
9. **Ensuring leather is biodegradable:** leather must have a safe end of life – by grinding it up and disposing of it in the garden or buried on the land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THANK YOU FOR YOUR ATTENTION