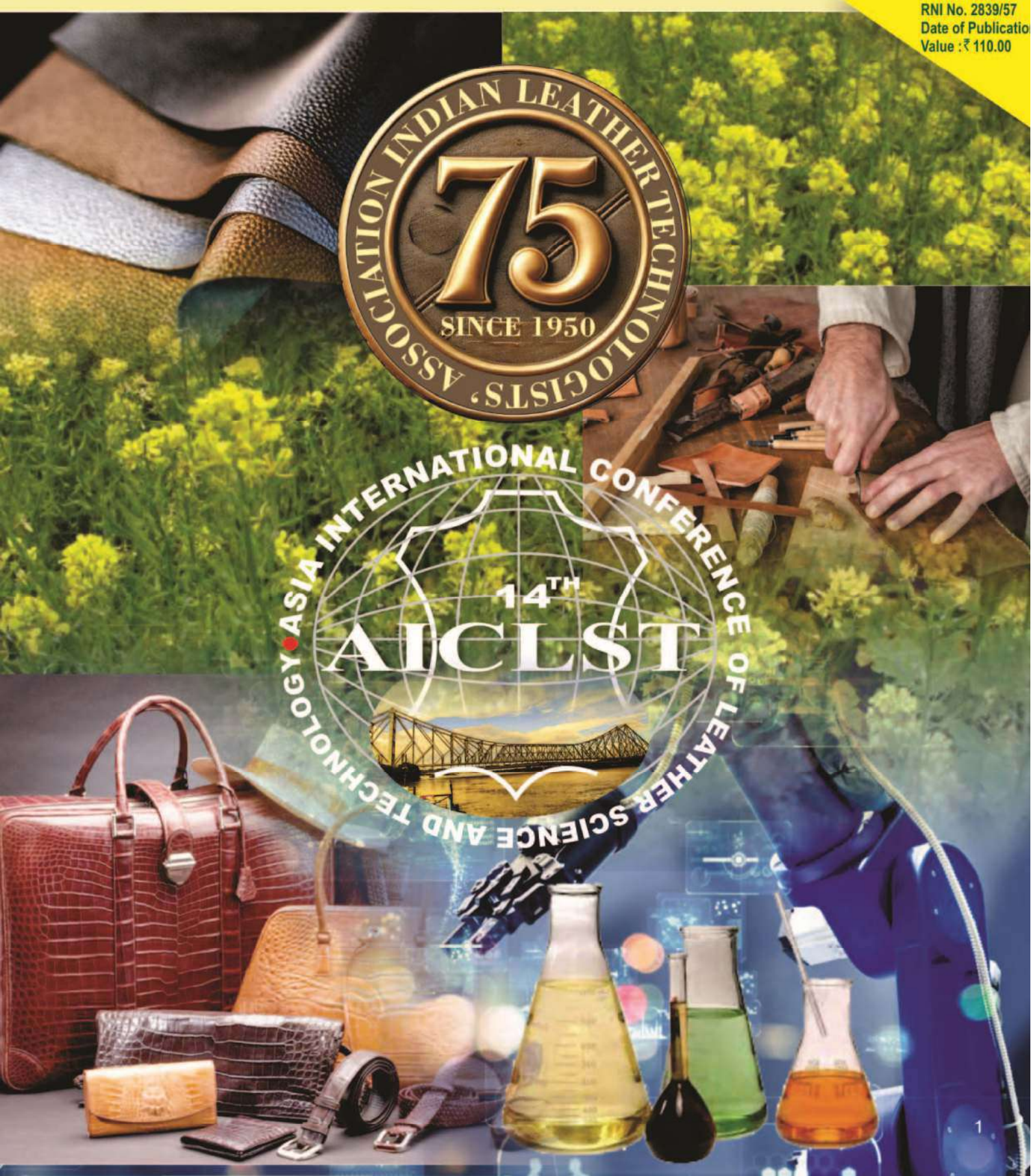
Journal of Indian Leather Technologists' Association

JILTA

ILTA
Since 1950

Rgtn. No.
KOL RMS/074/202
Regd. No.
ISSN 0019-5758
RNI No. 2839/57
Date of Publicatio
Value : ₹ 110.00



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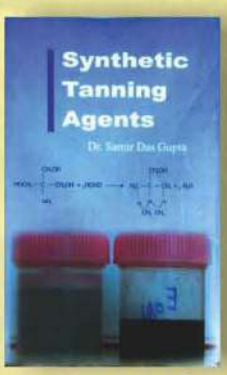

Title of the Book
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Author
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Author
Prof. B. M. Das

Price per copy*
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ILTA
Since 1950

Indian Leather Technologists' Association
[A Member Society of International Union of Leather Technologists' and Chemists

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Phone : 91-33-2441-3429 / 3459 WhatsApp +91 94325 53949
E-mail : admin@iltaonleather.org; mailtoilta@rediffmail.com
Website : www.iltaonleather.org

JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION
(JILTA)

MAY, 2025 VOL.: LXXV NO.: 05 RNI NO.: 2839/57 REGD.NO.: ISSN 0019-5758

Contents

Hony. Editor : Dr. Goutam Mukherjee

Communications to Editor through E-mail :

admin@iltaonleather.org; jiltaeditor@gmail.com

Cover Designed & Printed by :

M/s TAS Associate

11, Priya Nath Dey Lane, Kolkata - 700 036

Published & Printed by :

S. D. Set, on behalf of Indian Leather Technologists' Association

Published from :

Regd. Office : 'Sanjoy Bhavan', 3rd Floor,

44, Shanti Pally, Kasba, Kolkata - 700 107

Printed at :

M/s TAS Associate

11, Priya Nath Dey Lane, Kolkata - 700 036

Subscription :

Annual	Rs.(INR)	400.00
Foreign	$ (USD)	45.00
Single Copy	Rs.(INR)	50.00
Foreign	$ (USD)	4.00

All other business communications should be sent to :

Indian Leather Technologists' Association

'Sanjoy Bhavan', 3rd floor, 44, Shanti Pally

Kasba, Kolkata - 700 107, WB, India

Phone : 91-33-2441-3429

91-33-2441-3459

E-mail : admin@iltaonleather.org;
mailtoilta@rediffmail.com

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JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

Indian Leather Technologists' Association is a premier organisation of its kind in India was established in 1950 by Late Prof. B.M.Das. It is a Member Society of International Union of Leather Technologists & Chemists Societies (IULTCS).

The Journal of Indian Leather Technologists' Association (JILTA) is a monthly publication which encapsulates latest state of the art in processing technology of leather and its products, commerce and economics, research & development, news & views of the industry etc. It reaches to the Leather / Footwear Technologists and the decision makers all over the country and overseas.

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Front inside (2nd Cover)	Rs. 96,000/-
3rd Cover	Rs. 84,000/-
Back Cover	Rs. 1,20,000/-

Mechanical Specification

Overall size	:	27 cm X 21 cm
Print area	:	25 cm X17 cm

Payment should be made by A/c. Payee Cheque to be drawn in favour of :

Indian Leather Technologists' Association
and Payable at **Kolkata**

Send your enquiries to :

Indian Leather Technologists' Association
'SANJOY BHAVAN'
3rd floor, 44, Shanti Pally, Kasba, Kolkata – 700 107
Phone : 91-33-24413429 / 91-33-24413459
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(Member Society of International Union of Leather Technologists and Chemists Societies)

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Dr. S. Rajamani

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4. Mr. Aniruddha De
5. Mr. Dipayan Adhikary
6. Mr. Kunal Naskar
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INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (ILTA)

(Member Society of International Union of Leather Technologists and Chemists Societies)

Various Sub - Committees of ILTA

1) Estate Management Sub-Committee :-

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2) Regional Activities Sub-Committee :-

Co-Ordinator : Mr. Pradipta Konar

3) Finance Sub-Committee :-

Co-Ordinator : Mr. Aniruddha De

4) Project in Calcutta Leather Complex Sub-Committee :-

Co-Ordinator : Mr. Susanta Mallick

5) Membership Sub-Committee :-

Co-Ordinator : Mr. Abhijit Das

6) Seminar & Workshop Sub-Committee :-

Co-Ordinator : Mr. Satyanarayan Maitra

7) HRD & Social Welfare Sub-Committee :-

Co-Ordinator : Mr. Ratan Chowdhury

8) JILTA Sub-Committee :-

Co-Ordinator : Dr. Goutam Mukherjee

9) Digitalization of ILTA Publications Sub-Committee :-

Co-Ordinator : Mr. Kunal Naskar

10) Platinum Jubilee Celebration Sub-Committee :-

Co-Ordinator : Mr. Asit Baran kanungo

11) 14th Asian Congress (AICLST) Sub-Committee :-

Co-Ordinator : Mr. Arnab Jha

12) LEXPO Sub-Committee :-

Co-Ordinator : Mr. Asit Baran Kaunugo

JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

EDITORIAL BOARD OF JILTA


Leather Fraternity 75 years of service to the International

Natural Farming and Carbon Footprint

It is a universally acknowledged truth that meat and dairy farming is bad for the planet. While some farming methods are more sustainable than others, there is no getting away from the fact that the industry has a hefty carbon footprint. Many people choose to eat fish only, as there is a general perception that fish farming is a more sustainable option. However, we often forget that, as it stands at least, aquatic farming is riddled with the same issues as meat and dairy farming. But, with the work of innovative fish farmers and researchers, all may be about to change.

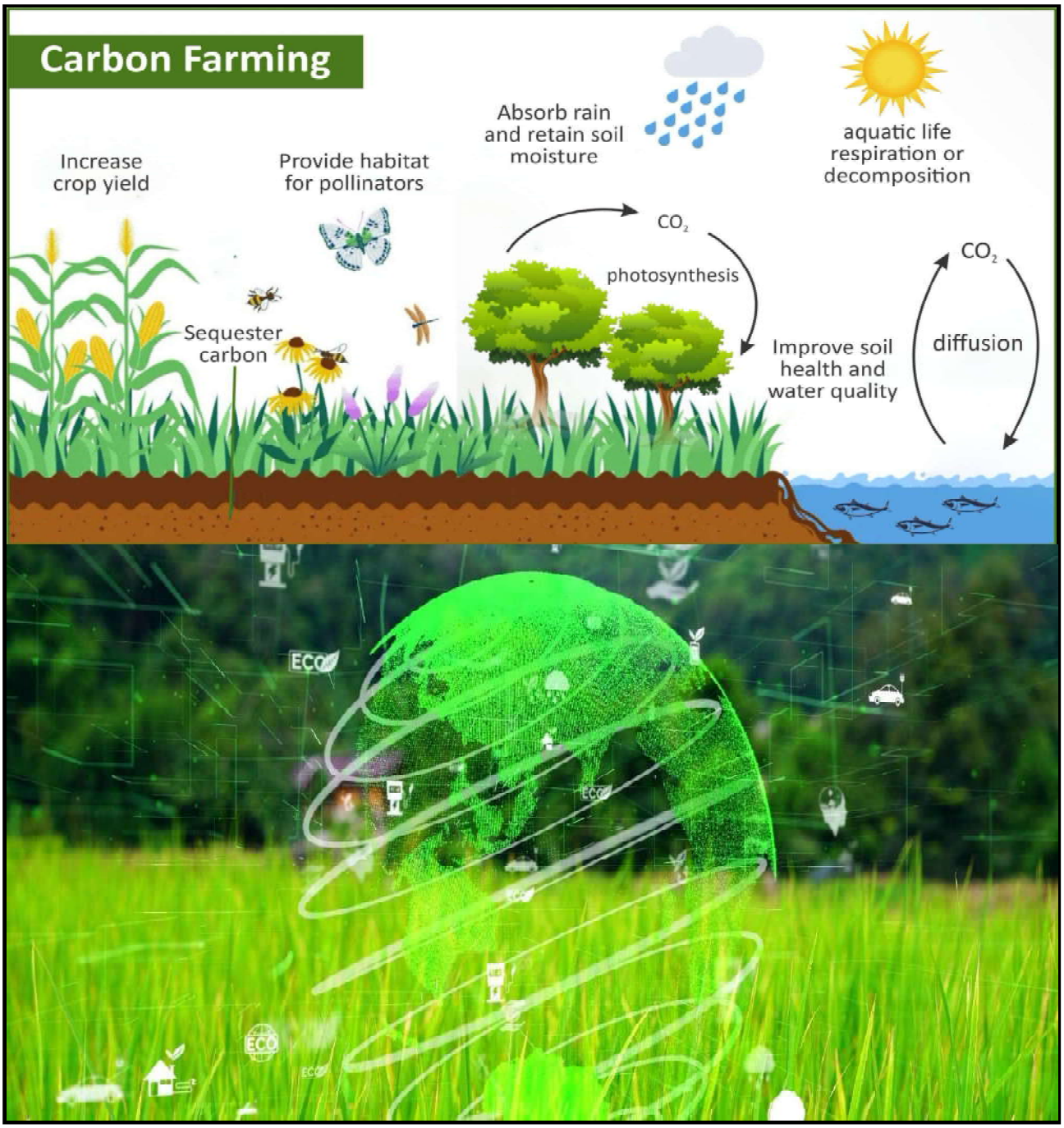
When it comes to climate change, lots of vegans and vegetarians would argue that the biggest culprits are the meat and dairy industries. Indeed, lots of non-meat eaters cite sustainability as the main reason that they abstain from indulging in steaks, burgers, spaghetti bolognese, etc. Fish and seafood are often seen as a more sustainable option; the fish industry does not have the same reputation as an evil climate polluter and yet many people forget, or do not even realize in the first place, that the majority of the fish and seafood we consume is not caught in the wild. Wild fish supplies simply would not be enough: studies show that 33% of wild fisheries are overfished and 60% are being fished at their maximum capacity. Instead, most of the fish we eat is grown through aquatic farming, or "aquaculture." And unfortunately, this industry exhibits many of the same issues as meat and dairy farming. One of the more common aquatic farming methods can be seen off the coasts of Norway and Chile. It involves offshore pens made of nets, in which the fish are cultivated. As with much industrially-farmed fauna, the fish grown in these pens occupy a (very) cramped space and produce a huge amount of waste. The waste that the fish produce is responsible for polluting the surrounding areas and may even spread disease to the neighbouring wild species. The antibiotics used to treat the fish are also partially excreted back into the ocean, thus harming the surrounding environment even further. Another problem is that the nets are susceptible to break, thus releasing huge numbers of fish into the ocean who compete for resources with their wild cousins. This would not be a problem if it were not for the fact that the fish who break free go on to disrupt ecosystems and even pollute gene pools because they are adapted for captivity. Another aquaculture technique is man-made coastal ponds. These are common in Southeast Asia, where they are often used for shrimp-farming. But just like net pens, these ponds are known to spread pollution and disease. What's more, in building these ponds important ecosystems, such as mangroves and marshes, are often destroyed. On a good day, mangroves and marshes protect coastal areas from storms, provide habitats for local species, and absorb lots of greenhouse gases. One way to tackle the problems associated with net pens and coastal ponds is to farm fish fully on land in systems that are completely contained.

These systems are able to filter and re-circulate water in a way that prevents pollution. However, fully-contained facilities are far from a perfect solution. There is no getting away from the fact that many inland-farmed fish consume large amounts of other fish, thus contributing to overfishing. Until researchers are able to develop a plant of insect-based fishmeal, this will continue to be a disadvantage of fully-contained fish farming facilities. But it is not all doom and gloom. Researchers are actively looking into ways that we can farm the oceans safely and sustainably.

One option involves looking at species lower on the food chain. We may be able to use the ocean's natural resources to produce huge amounts of shellfish and seaweed. This would negate the need to raise and feed heaps of meat-eating fish, since shellfish and seaweed do not need to be fed at all. Both species even improve water quality naturally: they filter it as they feed on sunlight and the nutrients that are already present in the sea water. These farms have the added benefits of extracting CO_2 by photosynthesis, de-acidifying ocean water, and providing optimum habitats for other species. Moving towards this type of underwater farming would provide jobs and would encourage

a healthy plant and shellfish-based diet that has a low carbon footprint. Studies show that in just five months, a 4000m^2 farm can produce 25 tonnes of seaweed and 250,000 shellfish. If the right distribution network is established, a collection of these small farms, which are already cropping up in different places around the world, could feed the planet Underwater farming may be problematic at the moment, but things are moving in the right direction and soon aquaculture may be a key player in the fight against climate change.

Dr. Goutam Mukherjee
Hony. Editor, JILTA



From the desk of General Secretary

ACTIVITIES OF VARIOUS SUB-COMMITTEES FOR THE TERM 2024-2026

The Executive Committee of ILTA have finalized forming of various sub-committees along with their Co-Ordinator & Members in the 567th Meeting held on 5th December, 2024. Details & Scope of work for every committee have already been published in the previous issues of JILTA.

However, the Executive Committee of ILTA in its 570th Meeting held on 8th April, 2025 has decided to submit some remarkable steps have been undertaken by different sub committees since last 4-5 months.

1. ESTATE MANAGEMENT SUB-COMMITTEE :

Mr. B. C. Jana, Coordinator of this committee and his team has undertaken the following jobs:

a) One Licensee has taken the possession of 1st & 2nd floor in 2 separate names i.e. M/s Safe Haven Survey & Pest Control on 1st floor and M/s Inspection Resource Associates Pvt. Ltd. on 2nd floor of ILTA building on Leave & License basis w.e.f 1st May 2025.

b) Renovation to habitable condition of 2nd floor of ILTA building has been completed for handing over the possession of the floor to the new Licensee.

c) A separate Security Room would be built up behind the main building as the fire exit could not be blocked by the security personals.

d) The committee has undertaken the initiative for obtaining the renewal of the fire NOC from the Fire department, Govt. of West Bengal as it has been pending to obtain due to some technical reasons.

e) The committee has undertaken a planning for Repairing, Painting and external Beautification of the ILTA building in view of the forthcoming Platinum Jubilee Celebration of our association and 14th AICLST at Kolkata. Also, a complete Pest Control including severe Termite Treatment has been undertaken by the committee.

2. REGIONAL ACTIVITIES SUB-COMMITTEE :

Regional committees have already been requested by the Platinum Jubilee Celebration Committee and AICLST Committee to organize seminars, workshops and webinars on the occasion of above celebrations. This committee is working with the regional committees as planned.

Mr. Pradipta Konar, Coordinator of the committee has been requested to take care of the above and submit proposals before the Executive Committee. The committee is also taking initiative to open bank account in Northern Region.

3. FINANCE SUB-COMMITTEE :

Coordinator of this committee Mr. Aniruddh Day and his team has submitted some proposals which are as follows:

a) Number of Advertisements in JILTA should be increased immediately. At least 7-10 annual advertisements and few short-term advertisements for JILTA should be collected and continue with immediate effect.

b) Skill development program and training program should be undertaken as much as possible. To get financial support for these programs, Common Facility Centre could be installed in the Kolkata Leather Complex area.

4. PROJECTS IN CALCUTTA LEATHER COMPLEX SUB-COMMITTEE :

Mr. Susanta Mallick the Coordinator of this committee has been trying since a long day to purchase a land for ILTA in Calcutta Leather Complex area. But no such suitable plot under suitable T & C has been available till now, on which ILTA can do something as per its memorandum.

However, very recently he had a meeting with Mr. Tapan Nandi, Sr. Life Member of ILTA and Chairman, ILPA Leather Goods Park regarding the issue. Mr. Nandi has assured him that he would help ILTA to purchase the land of around 1000 sq. mtr in the complex area for few promotional activities for the industry.

5. MEMBERSHIP SUB-COMMITTEE :

Mr. Abhijit Das, Coordinator of this committee and his team has been trying to get into a drive for collection of new members for our association and also trying to update the members database.

6. SEMINARS & WORKSHOPS SUB-COMMITTEE :

Mr. Satyanarayan Maitra, Coordinator of this committee and his team has been working continuously on this subject and planning that how knowledge sharing could be spread out among the stakeholders of Leather fraternity. As their maiden activity they are going to organize an important webinar on 9th May 2025, details of which are as follow :

Webinar on Future of Bisphenols in Leather Industry -

The above would be organized by the Seminar Committee on 9th May, 2025 at 07.30 PM IST (Registration from 07.00 PM) on the digital platform of Zoom.

Ms. Olga Ballus, Ph.D., Leather Laboratory – Wet Process, Cromogenia Units, S.A. / Group Units, has kindly consented to deliver the lecture titled ***"Future of Bisphenols in Leather Industry – An Overview"*** **in the webinar**.

Formal invitation along with e-invitation card has already been sent to all through email.

The video of this webinar would be uploaded in the official YouTube Channel of ILTA ***"ILTA Online"*** after the webinar.

7. HRD & SOCIAL WELFARE SUB-COMMITTEE :

Mr. Ratan Choudhury, Coordinator of this committee and his team has been working spontaneously in this field and planning that how knowledge sharing as well as welfare activities could be spread out among the stakeholders of Leather fraternity. This committee is going to organize an important webinar on 24th May 2025, details of which are as follow :

a. Webinar on Cyber Security

The above would be organized on the topic of Cyber Security on 24th May, 2025 at 07.00 PM IST (Registration from 06.30 PM) on the digital platform of Zoom.

Ms. Riveta Das, a Professional Consultant in Cyber Security, has kindly consented to deliver the lecture titled **"Cyber Security Essentials: Safeguarding Business in the Digital Age"**.

Formal invitation along with e-invitation card has already been sent to all through email.

Also, the video of this webinar will be uploaded in the official YouTube Channel of ILTA ***"ILTA Online"*** soon.

b. Health Care Benefits for ILTA Members

This initiative has been undertaken by the HRD committee under approval of the Executive Committee of ILTA to introduce Health Care Benefits for all the Members of the Association in collaboration with M/s Narayana Health, Kolkata. Initially the scheme is applicable for the members of Eastern Region only as the Pilot Project.

For benefits and other details about this project, you may kindly follow the HRD Corner.

8. JILTA SUB-COMMITTEE :

Dr. Goutam Mukherjee, Coordinator of this committee has been trying to upgrade the quality of our monthly technical journal JILTA with new informative articles, write ups, news, presentations etc. to enhance the knowledge sharing about the modern leather industry. He has proposed a new active Editorial Board for JILTA.

This new Editorial Board would be published in the next issue of JILTA.

9. DIGITALIZATION OF ILTA PUBLICATIONS SUB-COMMITTEE :

ILTA is going to launch a digital platform for availing all its publications including Text Books, JILTA and other publications online.

Work on this project is under process. The details of the same will be published very soon.

Mr. Kunal Naskar, Coordinator of this committee has been requested to take initative regarding this matter and to submit a report to the Executive Committee.

10. PLATINUM JUBILEE CELEBRATION SUB-COMMITTEE :

Mr. Asit Baran Kanungo, coordinator of this committee and his team has been doing hard jobs to make the event successful and memorable in all respects.

Mr. Kanungo has been trying to arrange to observe the celebration in all regions of ILTA at a time on 14th August 2025. He has already contacted with both the regional committee of ILTA regarding this matter. He also requested Mr. Konar, Coordinator of the Regional Activities Committee to get regular follow up with the regional committees, so that the mission could be successful.

Mr. Kanungo has also proposed few other events during this year-long celebration program.

The Science City Mini Auditorium in Kolkata has been booked for the said Platinum Jubilee Celebration which is going to be started along with 75th Foundation Day Celebration of ILTA on 14th August 2025 from 10.00 am onwards.

11. 14TH ASIAN CONGRESS (AICLST) SUB-COMMITTEE :

Mr. Arnab Jha as the Co-ordinator along with Mr. A. B. Kanungo, Dr. S. Rajamani, Dr. K. J. Sreeram & Mr. Susanta Mallick trying to make the above event a grand success. This event would be organized as a part of the year-long Platinum Jubilee Celebration of our association.

The event would be organized from 6th to 8th March'2026 at Hotel The Stadel, Kolkata. Number of meetings of the Steering Committee have been organized to prepare an accurate roadmap for organizing the conference. Also, the Theme, No and title of the Sessions, arrangement of the sponsorship and advertisement has also been discussed and would be finalized within a short while.

12. LEXPO SUB-COMMITTEE :

No actins have been initiated by this committee in view of the work load due to forthcoming Platinum Jubilee Celebration of our association and 14th Asia International Conference.

IDENTITY CARD FOR LIFE MEMBERS OF ILTA

The Executive Committee of ILTA has decided to issue a unique Plastic Identity Card to all the Life Member of ILTA against their Membership.

Hence, all the Life Members are advised to send the following information through official Email ID - **admin@iltaonleather.org** and/or WhatsApp No. - **9432553949** to ILTA office as soon as possible.

1) Name of the Member (In capital letter)
2) Full Residential Address of the Member
3) AADHAR No. (Masked)of the Member
4) Blood Group of the Member
5) A HD quality Photo of the Member
6) Mobile No. of the Member
7) Email ID of the Member

(Susanta Mallick)
General Secretary

YOUTUBE CHANNEL & FACEBOOK PAGE OF ILTA

An official **YouTube Channel** namely **ILTA Online** and a **Face Book Page** namely **Indian Leather Technologists' Association** has been launched for sharing the activities of our Association since November' 2020 and July' 2021 respectively.

You may find all the Lives / Video recordings of different Seminar, Symposiums & Webinars on both of these social medias along with our website **www.iltaonleather.org** time to time.

You are requested to kindly do **Like** & **Subscribe** the YouTube Channel and **''Follow**' the FaceBook Page to get regular updates on the activities of our Association.

PUBLISH YOUR TECHNICAL ARTICLE

Faculties, Research Scholars and students of various Leather Institutes may wish to publish their Research / Project papers in an Article form in this monthly technical journal, JILTA.

We use to offer an honorarium of Rs. 1,000/- for a single issue against any article selected for publication.

Interested author may sent their paper (in MS Word format) along with a PP Photograph and Contact details like Email, Mobile etc. to our email IDs: **admin@iltaonleather.org** / **iltaonleather1950@gmail.com**

Members are requested to :-

a) Kindly inform us your '**E-Mail ID**', '**Mobile No**', '**Land Line No**', through E-Mail ID: admin@iltaonleather.org or over Telephone Nos. : 24413429 / 3459. This will help us to communicate you directly without help of any outsiders like Postal Department / Courier etc.

b) Kindly mention your **Membership No.** (If any) against your each and every communication, so that we can locate you easily in our record.

RECEIVING PRINTED COPY OF JILTA EVERY MONTH

We have started to post Printed copy of JILTA from April' 2022 to members and all concerned as it was before Covid period. Simultaneously we have been sending the e-copy of JILTA through email also to all the concerned receivers.

If you are not receiving JILTA by Post or through email, may please verify your Postal Address and/or Email Id with our office at the earliest.

General Secretary and the Members of the Executive Committee are available to interact with members at 18.30 hrs, at our Registered Office on every Thursday

INTERNATIONAL UNION OF LEATHER TECHNOLOGISTS AND CHEMISTS SOCIETIES
(www.iultcs.org)

PRESS RELEASE FROM IULTCS

Collagen and Leather Journal Reaches Global Recognition Through ESCI and EI Indexing

It is with great pride that I, on behalf of the International Union of Leather Technologists and Chemists Societies (IULTCS), share outstanding news with the global leather science community.

In 2024, the scientific journal Collagen and Leather, jointly sponsored by Sichuan University and the China Leather Association, was successfully indexed by two of the most internationally respected academic databases: the Emerging Sources Citation Index (ESCI) and the Engineering Index (EI).

This accomplishment marks a significant milestone for our field. Collagen and Leather is now among a select few scientific journals in the leather sector to be globally recognized for its academic contribution and research quality. According to projections, the journal is expected to receive its first Journal Citation Reports (JCR) Impact Factor in June 2025, with an estimated score between 8.5 and 9.0 - a remarkable achievement.

The inclusion in ESCI and EI demonstrates the journal's commitment to scientific rigor, global relevance, and editorial excellence. It highlights the increasing visibility of leather-related research and reinforces the importance of advancing scientific understanding in sustainability, material performance, and technological innovation within our industry.

"It is hoped that Collagen and Leather can provide a publishing platform for the cutting-edge technologies in the global leather industry, facilitate in-depth exchanges among global leather science and technology workers, and contribute to the advancement of global leather science and technology."
- Ms. Qixian Zhang, Managing Editor, Collagen and Leather

As President of IULTCS, I would like to personally extend my heartfelt congratulations to Ms. Qixian Zhang and her entire team for this exceptional achievement. Your dedication and academic excellence not only elevate the journal, but also bring honor to the entire leather industry. We are proud to see a scientific publication from our field recognized with such a high impact factor.

IULTCS encourages you to continue publishing high-level articles that serve as a benchmark for scientific quality in the leather sector. The advancement of science is vital to the future of our industry, and your work is leading the way.

With sincere appreciation,

Dr. Joan Carles Castell
President, IULTCS

(Email dated 24/04/2025)

INTERNATIONAL UNION OF LEATHER TECHNOLOGISTS AND CHEMISTS SOCIETIES
(www.iultcs.org)

Newsleather

Stay curious, informed and connected

Edition 6, 2025

Welcome

This is the sixth edition of our scientific newsletter, dedicated to providing the latest updates on research, regulatory developments, technology, and standard methods in the leather industry.

NOTE: This newsletter is in English, Spanish and Portuguese. One version after the other.

In this issue, we feature an interview with Mr. Michael Costello, a board member of the ZDHC (Zero Discharge of Hazardous Chemicals) foundation. We are honored to have Mr. Michael Costello to collaborate with IULTCS. In today's interview we will focus only on chemical management and MRSL (Manufacturing Restricted Substances List); we will have another Newsleather with the ZDHC requirements for wastewater. For further information please consult the ZDHC website is: https://www.roadmaptozero.com

We extend our gratitude to Mr. Costello for his valuable collaboration on the IULTCS Newsleather.

Let me know if you'd like additional adjustments!

Please share your comments and suggestions to secretary@iultcs.org

Kind regards,

Dr. Luis A. Zugno, editor

INTERNATIONAL UNION OF LEATHER TECHNOLOGISTS AND CHEMISTS SOCIETIES
(www.iultcs.org)

IULTCS INTERVIEW

Lifeline: Michael Costello

Group Director of ESG (Environment, Social & Governance)

Michael is responsible for implementing Stahl's strategy of achieving ESG leadership in the industry and stimulating cooperation between its stakeholders. He presents the case of sustainable development to customers, brands, industry associations, NGO's and universities.

Aside from his role in Stahl, Michael serves as a board member of the ZDHC foundation and sits on the advisory board of the Renewable Carbon Initiative. He was a member of the Executive Committee of the Leather Working Group from 2017-2021. His focus is on raising awareness throughout the industry on sustainability-related topics like climate change mitigation, chemical management, Life Cycle Assessment, and supply chain transparency.

Michael joined Stahl USA in 1988 as a process chemist and subsequently occupied a variety of positions in the coatings and chemical processing industry. Having spent several years in commercial roles in Stahl and Momentive (formerly GE Silicones), Michael established the Stahl Polymers business unit in 2005 and served as its global director for ten years. He has held the ESG Group Director position since 2015.

Michael holds a BSc in Chemistry from University College, Dublin, Ireland, and an MBA from the University of Massachusetts, Boston.

See: https://www.linkedin.com/in/michael-costello-53782216

INTERNATIONAL UNION OF LEATHER TECHNOLOGISTS AND CHEMISTS SOCIETIES
(www.iultcs.org)

IULTCS Question 1: What is the mission of ZDHC? Are they a Non-For-Profit Organization?

ZDHC is a not for profit organization, based in Amsterdam, NL, focused on the global textile, apparel, leather and footwear value chains. The mission of ZDHC is toto achieve the highest standards for sustainable chemical management in these global value chains.

IULTCS Question 2: Why is it important for a tannery to be engaged with ZDHC?

Decisions are made in ZDHC that affect the tanning industry. It's better to be part of that decision making process, rather than having to react to decisions without preparation or discussion.

IULTCS Question 3: Please describe step by step what a tannery needs to do demonstrate conformance to the latest ZDHC MRSL as part of the LWG audit:

1. Ask their chemical supplier(s) for a ZDHC MRSL declaration for all the chemicals they supply.
2. Use this declaration from the chemical supplier as evidence of MRSL conformance during the LWG audit
3. Apply for access to ZDHC Gateway (Certified LWG tanneries can get free access to ZDHC Gateway (not membership). In the case of access to ZDHC Gateway, they can use this to demonstrate their level of conformance to the LWG auditor.

IULTCS Question 4: Explain the MRSL levels for the chemical supplier. Why this is important?

The ZDHC MRSL level 1, 2 and 3 in the ZDHC Gateway have been used since 2015 when the first MRSL was introduced. Chemicals are tested and verified against the latest MRSL (currently 3.1 is the latest version) by a third party. The chemical suppliers need to send chemical samples to an external accredited laboratory for testing.

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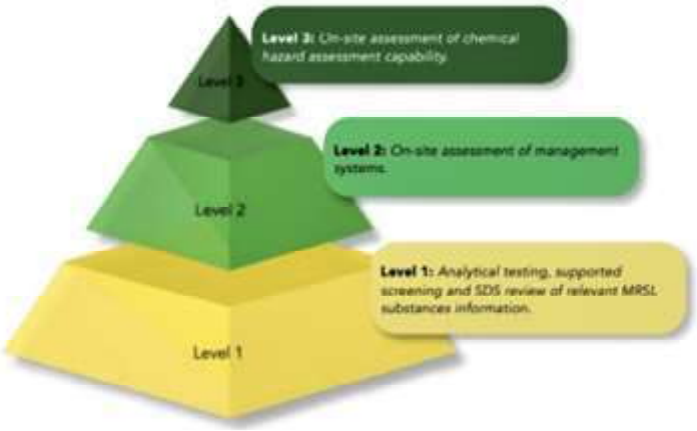

Figure 1: Diagram showin the basic requirements for the three levels. Source:https://downloads.roadmaptozero.com/input/ZDHC-MRSL-Conformance-Guidance

Level 1: is based on analytical testing of the chemical formulation for MRSL risks. An analytical test report from a ZDHC Approved Laboratory accreditted for ISO 17025 with proper scope is required as evidence of the ZDHC MRSL conformance for impurities.

Level 2: need evidence that Level 1 analytical evaluation of ZDHC MRSL is fulfilled. The audit includes on-site visit to the chemical formulation facility to evaluate the management sustems including environmental management systems (EMS), occupational helath and safety management system (OHSMS) and others.

Level 3: requires evidence that Level 1 and Level 2 have been achieved. There is a need for on-site assessement of of the chemical management system by the ZDHC Approved MRSL Certifier.

The ZDHC MRSL list can be found here: https://mrsl-30.roadmaptozero.com/

The details of the certification can be found here: https://downloads.roadmaptozero.com/input/ZDHC-MRSL-Conformance-Guidance

Notes:

1) A chemical supplier that produces in different countries need to be certified in each country. If a specific product is made in different countries, it must

be certified in each manufacturing country. It is best to cntact the thrid party supplier for these details.

2) The ZDHC certification has a validity period of two years

IULTCS Question 5: How the MRSL levels 1, 2 and 3 of the chemicals used in the tannery affect the LWG rating?

The more chemicals in the tannery's chemical inventory that are ZDHC Gateway Level 3 certified, the better the LWG score will be for that section of the audit. It is recommended that all the chemicals are at Level 3, since this means the supplier has also been audited.

IULTCS Question 6: Which ZDHC information is available to the chemical manufacturer, to the tannery and to the brands that buy from the tannery? What is this information available?

Chemical suppliers have access to ZDHC Gateway for their own formulations only. Tanneries who are ZDHC members or LWG rated tanneries have access to the chemical formulations in ZDHC Gateway.. Brand members have access to ZDHC Gateway, indeed they use ZDHC Gateway as a buyer guide.

IULTCS Question 7: What is the relationship between the ZDHC and LWG? Explain the integration to avoid duplication of audits.

ZDHC and LWG are separate organizations with different missions, but there is collaboration on chemical management and MRSL conformance. The chemical management part of the LWG audit (originally introduced as the CMM – Chemical Management Module) requires tanneries to demonstrate the conformance of the chemicals they use to the latest ZDHC MRSL.

IULTCS Question 8: Looking forward, what are the upcoming changes on the ZDHC?

The goals in ZDHCs strategy for 2030 are clear: 100% of chemical formulations used in the ZDHC Community and 70% of chemical formulations used in the global industry to conform to the ZDHC MRSL. Progress towards these goals is monitored closely and ZDHC activities for the coming years will be focused on achieving them, and measuring the impact of achieving them.

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Children's Shoes

Debabrata Chakrabarty

Footwear Technologist & Consultant, Hosur, Tamil Nadu

A good pair of children's shoes should have the following key characteristics :

1. Comfort & Fit

- **Proper Sizing** – Should fit well without being too tight or too loose.
- **Room for Growth** – A little extra space (about a thumb's width) in the toe box allows room for growth.
- **Flexible Material** – Soft, breathable, and lightweight materials to support natural foot movement.

2. Support & Protection

- **Cushioned Insole** – Provides comfort and absorbs impact.
- **Arch Support** – Essential for developing feet, especially for children with flat feet.
- **Padded Heel & Ankle Collar** – Prevents blisters and irritation.

3. Breathability & Hygiene

- **Ventilation** – Mesh or perforated uppers to allow airflow.
- **Moisture-Wicking Lining** – Helps keep feet dry and prevents odor.

4. Sole & Traction

- **Non-Slip Sole** – Rubber or textured soles for a strong grip and stability.
- **Flexible Outsole** – Allows natural foot movement without being too stiff.
- **Shock Absorption** – Reduces impact while running and playing.

5. Ease of Use

- **Adjustable Fastening** – Velcro, elastic laces, or slip-on styles for easy wearability.
- **Lightweight Design** – Ensures comfort for all-day use.

6. Durability & Quality

- **Strong Stitching & Materials** – Withstands wear and tear from active play.
- **Reinforced Toe Cap** – Prevents wear in high-impact areas.

7. Style & Appeal

- **Attractive Design** – Kids love fun colors and themes.
- **Reflective Elements** – Improves visibility for safety in low light.

Here's a breakdown of ideal shoe features for children aged **2-5 years** and **6-12 years** based on their activity levels and foot development needs:

2-5 Years (Toddlers & Preschoolers)

Key Priorities: Stability, Comfort, Easy Fastening

- **Lightweight & Flexible Sole** – Allows natural foot movement for early walkers.
- **Wide Toe Box** – Ensures enough space for growing toes.
- **Soft, Breathable Upper** – Mesh or leather for comfort and airflow.
- **Firm Heel Support** – Provides stability for wobbly steps.
- **Non-Slip Rubber Outsole** – Prevents slipping on smooth surfaces.

Corresponding author E-mail : sumiinternational36@gmail.com

- ❖ **Easy Fastening** – Velcro straps or elastic laces for independent wear.
- ❖ **Padded Insole** – Soft cushioning for comfort.

Best Types:

- ✓ Velcro Sneakers
- ✓ Soft-Soled Shoes
- ✓ Sandals with Toe Protection
- ✓ Boots with Flexible Soles

6-12 Years (School-Age Kids)

Key Priorities: Durability, Support, Versatility

- ❖ **Arch Support** – Helps with proper foot alignment, especially for active kids.
- ❖ **Reinforced Toe Cap** – Prevents wear from running and jumping.
- ❖ **Shock-Absorbing Midsole** – Reduces impact on joints.
- ❖ **Non-Skid Outsole** – Enhances grip for sports and play.
- ❖ **Breathable Materials** – Reduces sweating and odor.
- ❖ **Lace-Up or Velcro Options** – Lace-ups provide a secure fit, while Velcro is easier for younger kids.

Best Types:

- ✓ Sneakers for daily wear & school
- ✓ Sports Shoes (running, basketball, football)
- ✓ Hiking Shoes for outdoor activities
- ✓ Casual Slip-Ons for comfort

Here's a **tabulated comparison** of ideal shoe features for **2-5 years** and **6-12 years** age groups:

Feature	2-5 Years (Toddlers & Preschoolers)	6-12 Years (School-Age Kids)
Sole Type	Lightweight, flexible, soft rubber	Durable, shock-absorbing
Toe Box	Wide for toe movement	Reinforced for durability
Upper Material	Soft, breathable mesh or leather	Breathable mesh or synthetic
Heel Support	Firm for stability	Moderate to high for support
Fastening	Velcro, elastic laces for easy wear	Laces, Velcro for secure fit
Outsole Grip	Non-slip rubber for safety	Non-skid with better traction
Arch Support	Minimal (natural foot development)	Essential for active kids
Insole Cushioning	Soft for comfort	Cushioned for shock absorption
Durability	Medium (frequent growth changes)	High (for active use)
Best Shoe Types	Velcro sneakers, soft-soled shoes, sandals with toe protection	Sneakers, sports shoes, hiking shoes, slip-ons

The choice between **leather and synthetic materials** for children's shoes depends on factors like comfort, durability, breathability, and cost. Here's a comparison to help you decide:

Feature	Leather	Synthetic Material
Breathability	☑ Excellent – Natural ventilation keeps feet cool and dry.	✗ Moderate – Less breathable, may cause sweating.
Durability	☑ Long-lasting – Withstands wear and tear.	✗ Wears out faster, especially in active kids.
Flexibility	☑ Softens over time – Adapts to foot shape.	✗ Less flexible – Can feel stiff initially.
Comfort	☑ Soft and gentle on the skin.	✗ May cause discomfort or irritation in some cases.
Water Resistance	✗ Absorbs water – Not ideal for wet conditions.	☑ Water-resistant – Better for rainy or damp conditions.
Maintenance	✗ Requires polishing and care to maintain quality.	☑ Easy to clean – Wipe with a cloth.
Eco-Friendliness	✗ Uses animal products, but lasts longer.	☑ Vegan-friendly but may contribute to plastic waste.
Cost	✗ More expensive but worth the investment.	☑ More affordable and widely available.

Which One Should You Choose?

- ➢ **For Daily Wear & Comfort - Leather** (Better breathability, durability, and flexibility)
- ➢ **For Rainy or Rough Play - Synthetic** (Water-resistant, easy to clean, budget-friendly)

Here are some **recommended children's shoe brands** offering high-quality **leather and synthetic options** for different age groups:

2-5 Years (Toddlers & Preschoolers)

Brand	Leather Shoes	Synthetic Shoes
Clarks	Soft leather first walkers, Velcro sneakers	Lightweight synthetic sneakers
Stride Rite	Leather sneakers & sandals with arch support	Water-resistant synthetic sports shoes
Bobux	Premium leather shoes for toddlers	Soft synthetic play shoes
Froddo	Eco-friendly leather shoes with flexible soles	N/A (Mostly leather)
Pediped	Leather casual shoes & boots	Vegan-friendly synthetic options

6-12 Years (School-Age Kids)

Brand	Leather Shoes	Synthetic Shoes
Nike	Leather sneakers for school wear	Lightweight running shoes
Adidas	Leather casual sneakers	Durable synthetic sports shoes
Geox	Breathable leather school shoes	Waterproof synthetic sneakers
New Balance	Leather sneakers for support	Performance sports shoes
Puma	Leather & suede casual sneakers	Stylish, lightweight synthetic shoes
Kickers	High-quality leather school shoes	N/A (Mostly leather)

Best for Specific Needs

- ✓ **Best for School:** Clarks, Geox, Kickers
- ✓ **Best for Play & Sports:** Nike, Adidas, New Balance
- ✓ **Best for Early Walkers:** Stride Rite, Bobux, Pediped

"Ecco" is an excellent brand for children's shoes, known for its premium quality, comfort, and durability. It primarily uses **high-quality leather** but also incorporates synthetic materials in certain models for waterproofing and flexibility.

Why Choose Ecco for Kids?

- ✓ **Premium Leather** – Soft, breathable, and adapts to the foot's shape.
- ✓ **Gore-Tex Technology** – Waterproof and breathable synthetic layers for all-weather protection.
- ✓ **Flexible & Lightweight Soles** – Supports natural movement.
- ✓ **Orthopedic-Friendly Design** – Good arch support and cushioning.
- ✓ **Durability** – High-quality materials last longer.

Best Ecco Shoes for Kids (Ages 2-5 & 6-12)

Shoe Type	Recommended Models	Features
Everyday Sneakers	Ecco First, Ecco Street Tray K	Soft leather, flexible sole
School Shoes	Ecco Cohen, Ecco Urban Mini	Smart leather shoes with cushioning
Waterproof Shoes	Ecco Urban Snowboarder, Ecco Biom K	Gore-Tex waterproof protection
Sports Shoes	Ecco Biom Raft, Ecco Biom K	Lightweight, breathable, good grip
Winter Boots	Ecco Snow Mountain	Insulated, waterproof, warm lining

- ❖ **Leather vs. Synthetic in Ecco Shoes**
  - ✓ **Leather Models** – More breathable, long-lasting, and naturally comfortable.
  - ✓ **Synthetic/Gore-Tex Models** – Best for wet conditions, easy to maintain, and durable.

- ❖ **Verdict:** If you want premium comfort, durability, and a mix of classic and modern designs, **Ecco is a great choice!**

While **Ecco** is a premium international brand known for high-quality leather and advanced technology, there are **Indian brands** that offer good alternatives at different price points. Here are some **comparable Indian brands** based on quality, durability, and comfort :

Indian Brands vs. Ecco

Feature	Ecco (International)	Indian Alternative
Premium Leather Shoes	☑ Yes – High-quality soft leather	☑ Bata (Hush Puppies, North Star), Woodland
Waterproof Gore-Tex Models	☑ Yes – Gore-Tex technology	☑ Red Chief (Hydro-Trex), Liberty (Force 10 All-Weather)
Everyday Sneakers	☑ Yes – Leather & synthetic mix	☑ Paragon (Meriva), Relaxo (Sparx)
School Shoes	☑ Yes – Formal leather school shoes	☑ Bata (Bubblegummers), Lakhani, Action
Sports & Running Shoes	☑ Yes – Ecco Biom series	☑ Campus, Asian, Sparx
Outdoor & Adventure Shoes	☑ Yes – Rugged and flexible soles	☑ Woodland, Red Chief, Liberty Warrior

Top Indian Brands Comparable to Ecco

Brand	Best For	Comparable to Ecco?
Bata (Hush Puppies, North Star)	Leather casual & formal shoes, school shoes	☑ Yes, for leather shoes
Woodland	Tough outdoor & trekking shoes	☑ Yes, but heavier & rugged
Red Chief	Casual & semi-formal leather shoes	☑ Yes, good quality leather
Liberty (Force 10, Warrior)	Budget-friendly waterproof & sports shoes	☑ Yes, for synthetic/waterproof shoes
Campus & Sparx	Affordable sneakers & sports shoes	✗ No, lacks premium leather quality

Best Indian Alternatives to Ecco Based on Use Case

- ✓ **For Premium Leather Shoes -** Bata (Hush Puppies), Red Chief, Woodland
- ✓ **For Waterproof Shoes -** Liberty (Force 10), Red Chief (Hydro-Trex)
- ✓ **For School Shoes -** Bata (Bubblegummers), Lakhani, Action
- ✓ **For Sports & Running -** Campus, Asian, Sparx

Best Global Brands for Children's Leather Shoes

If you're looking for the **best premium global brands** for **children's leather shoes**, here are the top names known for **quality, durability, and comfort** :

Top Global Brands for Children's Leather Shoes

Brand	Country	Why It's the Best?	Best For
Ecco	Denmark	High-quality soft leather, Gore-Tex waterproofing, orthopedic-friendly	Everyday wear, waterproof shoes, active kids
Clarks	UK	Classic school shoes, soft leather, flexible soles	School shoes, casual sneakers, all-day comfort
Stride Rite	USA	Orthopedic support, durable leather, wide-fit options	Toddlers, preschoolers, arch support
Bobux	New Zealand	Pediatrician-recommended, soft natural leather, flexible design	First walkers, toddlers, barefoot feel
Geox	Italy	Breathable leather, patented sole for airflow, stylish designs	Fashionable casuals, school shoes

Brand	Country	Why It's the Best?	Best For
Kickers	France	Strong, durable leather, great for school & formal wear	School shoes, everyday leather sneakers
Froddo	Croatia	Eco-friendly leather, toxin-free materials, handcrafted quality	Sustainable shoes, premium leather comfort
Ricosta	Germany	Lightweight, durable, waterproof leather shoes	Outdoor play, casual wear
Naturino	Italy	Soft leather with shock-absorbing insoles, stylish design	Trendy casual wear, everyday use
Pediped	USA	Approved by podiatrists, soft leather, flexible soles	First walkers, growing kids

Best Brand Based on Category

- ✓ **Best Overall: Ecco** (Durability + Comfort + Waterproofing)
- ✓ **Best for School Shoes: Clarks, Kickers, Geox**
- ✓ **Best for First Walkers (2-5 yrs): Bobux, Stride Rite, Pediped**
- ✓ **Best for Fashionable Casuals: Geox, Naturino**
- ✓ **Best for Eco-Friendly Leather: Froddo**

ANNOUNCEMENT

ILTA LAUNCHED HEALTH CARE BENEFIT FOR ITS MEMBERS

Indian Leather Technologists' Association (ILTA), a member society of IULTCS and a pioneer organization in the field of leather industry, has now tied up itself with the hospital the Narayana group for Eastern India with a view to giving Indoor, Outdoor and Medical testing services to all of its registered (both life and ordinary) members at concessional rates.

Offer & Discount :

1. **OPD Service:** 10% discount on Doctor's Consultation, Prevailing Health Check-ups available at hospital, day care procedures, Investigations except outsourced tests.
2. **IPD:** 5% on total IPD billing as per prevailing hospital tariff excluding medicine / consumable / implant / outsource & blood bank services. (Not applicable on insurance cases/ Govt scheme / ESIC and any other schemes & promotional package or offers & discounts).
3. **Ambulance:** As per Availability & as per Narayana Health ambulance policy & charges.
4. **Payment Terms:** Payment should be only in Cash Mode, Debit Card, Credit Card, NEFT/RTGS/ IMPS. No cheques shall be accepted.

These facilities will be extended to its existing members (both Life & Ordinary) only. Six family members including spouse, two children (below 25 years) and dependent parents will be entitled to avail these facilities. The persons concerned may contact Mr. Bibhas Chandra Paul, OSD, ILTA (Mob. No. 9432553949) and / or Mr. Subha Paul, Assistant Manager - Payor Relation, Narayana Health (Mob. No. 8334847000) for further details.

ILTA will issue a Health Card in favour of each Member. Thus, Members are requested to collect the prescribed application format to avail this facility either from ILTA Office or through email.

ILTA IS ON THE WAY TO DIGITAL PLATFORM

Indian Leather Technologists' Association is now set for digitalization of its all publications. The members and non-members alike are eligible for this facility. The association has been publishing number of books on leather & footwear technology since inception. Also, the Association has a great collection of number of articles from renowned personalities & scientists of leather fraternity worldwide which has been publishing in our only technical journal namely "Journal of Indian Leather Technologists' Association (JILTA)".

All the above facilities will be available to all the interested peoples on digital platform through the official website of the Association very soon.

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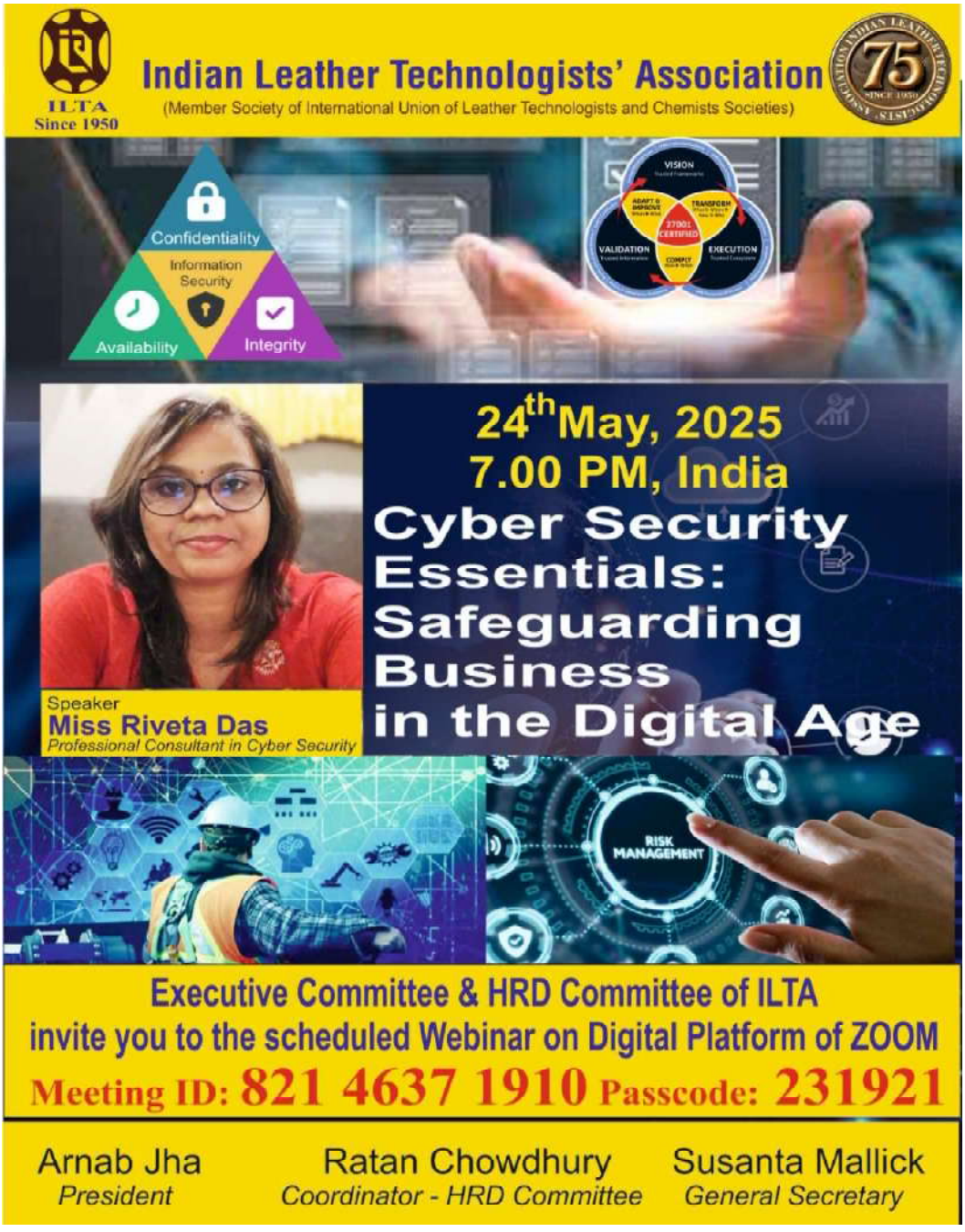
WEBINAR ON CIBER SECURITY

This would be organized on **24th May, 2025** at 0**7.00 PM IST** (Registration from 06.30 PM) on the digital platform of **Zoom**.

Ms. Riveta Das, a Professional Consultant in Cyber Security, would deliver the lecture titled **"Cyber Security Essentials: Safeguarding Business in the Digital Age"**.

Formal invitation along with the following e-invitation card has already been sent to all through email.

Recorded Video of this webinar will be uploaded in the official YouTube Channel of ILTA ***"ILTA Online"***.



Hands on Leather Finishing : Nubuck, Suede Finishng : Scope, Challenge, Limitations and Successful Production and Possibilities

Pulok Mazumder

Vice President, ILTA - Northern Region

Nubuck :

Joint Industry Leather Standard and Guidelines Committee USA finds complexities of using leather gave rise to the need for education for everyone in leather equation from the consumer to the tannery. They set terminology with other Joint Industry leather Standards like AFMA and AHFA as per them ***"NUBUCK is a crust leather that has received only aniline dyes for color, then dried, conditioned, softened, sanded, or buffed, and milled. surface has visible nap. Shades may vary from hide to hide within a single hide. Require a high degree of preventive maintenance. Susceptible to surface scratches. May have special effects, such as, but not limited, to wax, oil."***

In other terms related to tanners **"All leather which are buffed and left coarse on the grain side. A very fine, velvety plush character is achieved by the very dense fiber texture of the grain layer."**

Suede :

The name suede leather was originally applied in France o glove leather of Swedish origin which had velvety surface somewhat like that of chamois leather. Suede refers to all leathers which have been given an even, rough, or velvety fiber quality on the back (flesh or split side by repeated buffing. This velvety is kept short -fiber or long fiber depending on the requirements of fashion.

There are some different terms related to suede -hunting suede leather with grain side, suede calf with grain side is known as velvet calf.

Split suede leather – the suede nap is carried out on the split side of the lower split. Lower splits (flesh splits) of firm texture made from half or whole cow hide butts in higher weight classes. At one time the name appears to have been restricted to the soft alum tanned sheep skins finished on flesh side with velvety nap.

There is no such restriction now a days. Leather with all tannages and from all sorts of skins and even hides are finished with velvety nap are called suede leather.

Nubuck and Suede Specification for leather Goods and furniture.

Leather goods Specification need to be taken care in finishing of nubuck and suede

Colour fastness test :Rubbing BS EN ISO 105-X12:2002 Suede

Requirement - Dry -Grade 3
Wet -Grade 2-3

Furniture Specification need to be taken care in finishing of nubuck and suede most –

As stated by Joint Industry Leather Standard and Guidelines Committee USA Nubuck and Suede leather characteristic for furniture Nubuck and Suede is very stringent in terms of –

Color fastness (Veslic) to-and-fro Rubbing :

Evaluated using "Grey scale for staining (ISO105/03)

Recommended values :

Grey Scale >/= 3 (50 cycles Dry)
Grey Scale >/= 3 (20 cycles Wet)
Grey Scale >/= 3 (20 cycles Artificial Perspiration)

Test Method -EN ISO 11640 /ENISO11641

Corresponding author E-mail : mazumderpulok@gmail.com

As stated by BLC IS SIMILAR SPECIFICATIONS STATED ABOVE EXTRA IS CROCK FASTNESS

CROCK FASTNESS -METHOD: ISO 20433: 2005 Dry requirement; GSR ¾ WET GSR 3

OTHER characteristics recommended by JILSG USA are – Colour fastness to light, PH, Tear Strength, Tensile Strength and by BLC FASTNESS TO LIGHT, FASTNESS TO WATER, MAINTAINABILITY, OIL REPELLANCY, WATER SPOTTING and Water Vapour Permeability.

IKEA is demanding similar like BLC specification sometimes harder with VOC and TVOC requirement.

Shoe Upper requirement of Nubuck and suede leather :

With above stringent requirement it's not always possible to make Nubuck and Suede leather in crust yard.

Why it's not easy to get consistence colour, quality of Nubuck, Suede we will discuss here.

Requirement of raw material of Nubuck : Clean grain cow hides, buff calf, goat skins which are free from defects.

Requirements of raw materials of Suede : Cow hides, Goat and Pig Skins are preferred but Buff calf or Jhutia are also getting prominence by buyer (demand of protective Shoe upper segment making it popular choice against Cow).

Nubuck and Suede Finishing -why it is required ?

It is required for below reason –

- **Levelling and corrections of shades** by **Dye Solutions and Pigment.**
- **Increase brilliance and depth of shade.**
- **Improvement of colour fastness**
- **Improvement of surface touch**
- **Improvement of water fastness**
- **Levelling and correction of shades**
- **Upgrading Articles from Nubuck**

(Protective Footwear requirement of Nubuck and Crazy Horse/ Upgrading Special Properties Development)

Many Suedes and Nubuck leather are submitted to a final surface treatment with special top coating agents, so called lustres. This treatment serves to produces utility value of the leathers, to give the leather special handle properties, to improve colour fastness and to level or correct shade.

The lustre is mainly applied by spraying to ensure uniform dosage. The products to be applied by spraying to ensure a uniform dosage. The Products applied can be diluted in three different ways :

1. in an aqueous base
2. in a water /solvent mixture
3. in the solvent phase only

The nubuck and suede nap or lustre may be addressed in following application and formulation by author in his 40 years of developing leather goods and furniture for his customer needs throughout India. Author has achieved required fastness spec successfully choosing appropriate products after a lot of trial and test.

- **Levelling and corrections of shades** by **Dye Solutions and Pigment :**

  Dyes or shades or also stained patches can be corrected primarily by means of pigment, dyes having low content of binder (Lower solid). The binder is necessary to avoid powdering of the pigment and fixing of dyes. The application quantity for each type of leather should be determined exactly because of the fibres mostly stick together if excessive amounts, especially **polymer binders** are used.

  To avoid hardening by an increased content **of** dry substances of this lustre, plasticisers such as **fatty substances, oils or waxes** are added. Small amounts of **penetrators or cross linker** added by **author** to regulate the depth of penetration of aqueous lustres and water fastness to gather with polymer.

- **Increase of brilliance and depth of shade** by selected **aniline dyes, colour lakes :**

  Several branded products marketed by chemical company successfully adopted by author and tanners to do consistence production of Nubuck and Suede.

The main characteristics to selection of dyes from chemical supplier product are –

- High fastness properties
- High Transparency
- Extremely Brilliant and intense colour effects.
- Excellent water spotting resistance
- Good PVC migration and light fastness

These dyes are concentrated solutions of homogeneous, salt free, metal complex dyes in water miscible acceptable organic solvent.

The colouring components used for such lustre are commercially available aniline colours or colour lakes with highest fastness properties or organic pigments preparations of very fine particle.

The main characteristics to select same pigment and colour lakes from chemical supplier product are –

- **High fastness properties**
- **High Transparency**
- **High Brilliancy.**
- **Excellent Migration fastness**
- **Good heat and light fastness**

In many cases **colourless lustres** also result in **a deepening of shade and enhanced brilliance** solely because of their content of **fat, oil, or binder.**

- **Improvement of colour fastness : with specialty finishing auxiliary for Nubuck and Suede article :**

All suede and Nubuck leathers ,especially if they have been rebuffed after dyeing ,will cause a greater or lesser amount of staining when rubbed in dry condition. This is due to the existence of very fine particles of dyestuffs dust or residues of dyed fibres which remain on the surface of even after de-dusting, brushing, dry milling and subject to air blow. In such cases a lustre is applied to bind the dust, its main component is polymer binders of very fine particles which should be as soft as possible. When using these products, it is particularly important to ensure that the fibre do not stick together or harden because of excessive film formation. In many cases author found the improvement of colour fastness improved with some branded products, some are causing insignificant improvement.

Better results are often achieved if tanners select **specialty products based on resin-based compound** used to brighten and enhance shades, whilst maintain the natural appearance of sueded and nubuck lustre depicting following character:

- ✓ Enhanced shade brightness
- ✓ A natural feel even enhanced.
- ✓ Improved resistance to dulling and fading.
- ✓ Improved crock fastness

Here three types of products normally tanners and author used during production of Nubuck Suede :

1. **Nubuck and Suede Depth and Lustre Oils: Organic Products for permanent Touch.**

   Some high concentrated formulated oils and fat liquors **gives greasy and oily permanent lustre (Two-way Nap)** and increase shade by 25% depth. A calculated amount ranging from 2-3 gm and above need to be sprayed to get required lustre and depth with touch required.

2. Here **Waterproof effect and permanent remaining touch** if tanners want, there are available formulated oils which are suitable for Nubuck and Suede. The main benefit of leather treated with said non-ionic oils are gives excellent shoer proofing effect, the leather maintains its natural aspects and lustre.

3. **Nubuck and Suede Deepening Polymer: Aqueous based polymeric materials.**

   These types of products marketed by a few specialised chemical suppliers dedicated for leather finishing.

   Imparts the following performance benefits when applied to nubuck and suede articles.

   - ✓ **Remarkably deepens shades.**
   - ✓ **Imparts pronounced and very pleasant silky touch.**
   - ✓ **Improve crock fastness**

- **Improvements of surface handle: by oil, wax of anionic, cationic, and non-ionic oils and fat mixture :**

  Lustre is chosen by Autor and Leather Engineer which improve the surface handle or give a special effect such as a two-way nap or fatty handle. The products used are anionic, cationic, and non-ionic oil or fat mixtures which exactly matched to each other. A variation of desired effect can be matched, here fat content is important to administered dosage. Many of above products are of concentrated nature of solid of 95% or more.

  - ✓ Formulated oils and fats - 95% concentration gives greasy and parament oily touch.
  - ✓ Formulated Waterproof Oil of 95% concentration producing remaining touch for life.
  - ✓ Self-emulsifiable synthetic triglycerides of 98% to obtain neutral oily touch.

- **Improvement of Water Fastness : by waterproof Oils of high concentration :**

  These lustres have the function of reducing increased wettability of the leathers. The products used commercially available water-repellent agents based on chromium stearate, fluor stearate, silicones, polymer products having a fat liquoring effect, paraffin emulsion or modified polyurethane solutions.

  Many of above products are coming from –

  - ✓ Formulated Waterproof Oil of 95% concentration producing shower proof and waterproof ness
  - ✓ Formulated water based Polyurethane matt polymer producing effective water fastness with soil protector.
  - ✓ Formulated water dispersed fluorocarbon resin improves water repellence.

- **Upgrading articles based on Nubuck : Protective Footwear :** (Protective Footwear requirement of Nubuck and Crazy Horse/Upgrading Special Properties development)

  In Protective Footwear segment Safety Shoes are no more conventional rough and tough Shoes of orthodox styles, there is more and more fashion shoes concept coming to protective footwear designing and concept where fashion makes in road in Fire Fighter Shoes, Industrial environment. Here comes Buffalo upgrading articles made from Buffalo DIN Nubuck Leather where Nubuck and Crazy Horse without reducing Nubuck look and touch.

  Aniline Dyes or shades or also stained patches can be corrected primarily by means of **Pigment**, **Dyes** having low content of **Binder (Lower solid).** The binder is necessary to avoid powdering of the pigment and fixing of dyes. The application quantity for each type of leather should be determined exactly because of the fibres mostly stick together if excessive amounts, especially **polymer binders** are used**.** To avoid hardening by an increased content **of** dry substances of this lustre, plasticisers such as **fatty substances, oils or waxes** are added**.** Small amounts **cross linker** added by **author** to regulate the aqueous lustres and water fastness to gather with **Polymer topcoat**. Here inorganic matting agent in aliphatic PU dispersion produces strong matting effect with outstanding clarity and transparency (Jet ness) especially suitable for much demanded Black and Brown colour shoes generally demanded by USA, Australian market.

  These articles are of waterproof DIN and Non-DIN nature, above mention finishing technique is much sought after to make Buffalo looks like Cow Articles or shows where it is cost effective too.

- **Upgrading Approach - during split suede lot from diverse wet blue stock -"One Window Suede"**

  It's an issue when large Suede order executed by tanners, tanner's dilemma is managing same shade in one lot, which is very difficult as one drum lot produces 7/8 colour tone in particular one colour.

  The remedy author learnt from tanners to make one window suede incorporation base colour ting with all colour in pigment mix and apply then resorting.

- **Nubuck and Suede Leather – Leather Care need during Footwear and leather goods making.**

  Author frequently receives call from tanners to how to avoid suede and nubuck cleaning and protection during shoe and furniture making process - this is happening during manufacturing process.

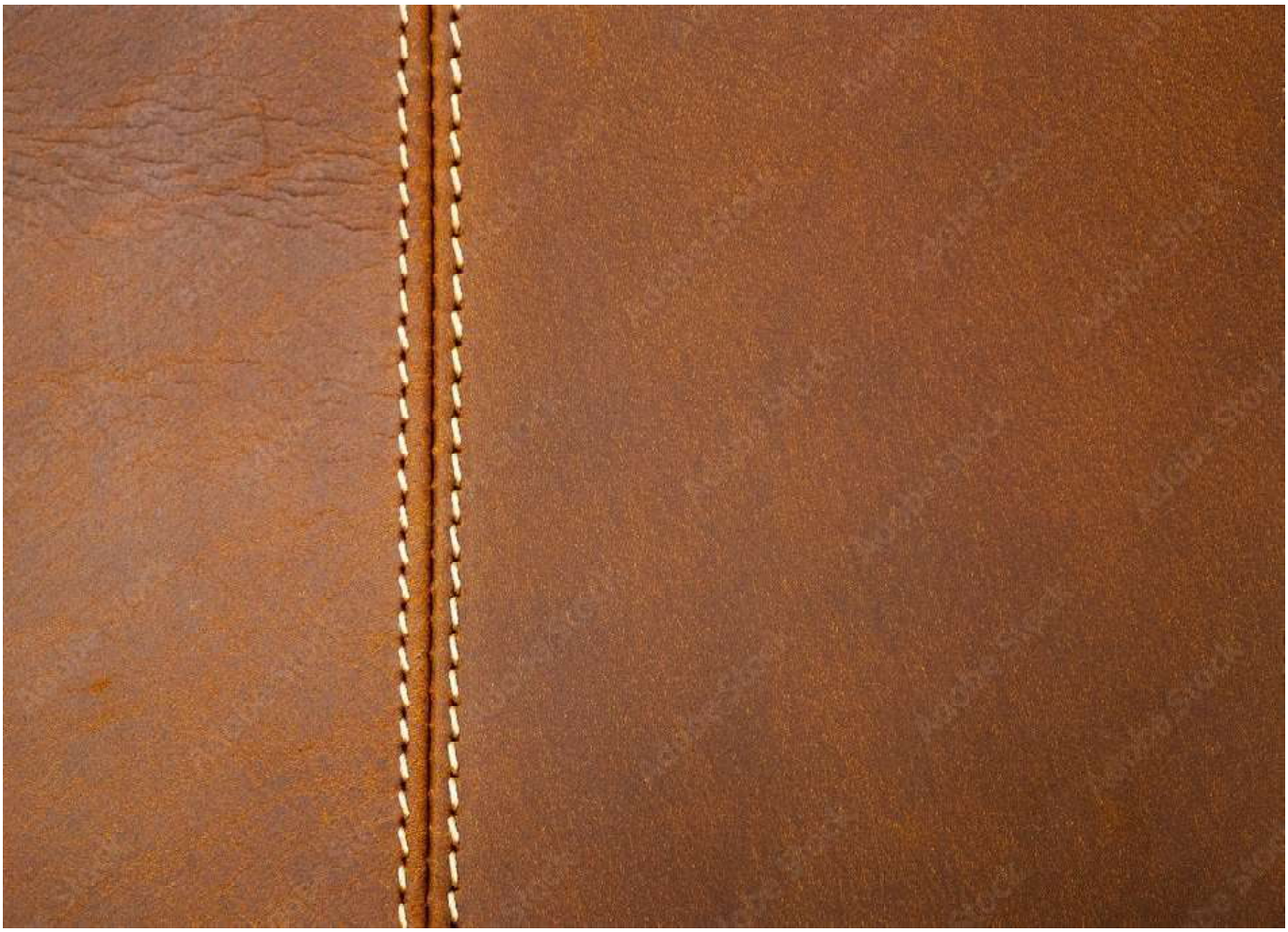
- ✓ Nubuck and suede are easily soiled, best way to clean them from soiling by scrape off with blunt knife, wash off with water using cloth or brush, allowing leather or shoes to dry, brush out remaining dust with nubuck suede brush.
- ✓ Restoring nap - brushing is always best with nubuck brush and a circular motion is recommended. To raise a nap on small stubborn area by rubbing gently with emery paper or using blunt knife
- ✓ Brushing suede affected areas by dampen the surface suede surface by holding 6 inches from a steaming kettle spout is a good method.
- ✓ Nubuck leather and shoes or leather goods cleaning by wiping with cloth dipped in slightly soapy warm water.
- ✓ Nubuck protection using by sprays and foams also can be adopted -branded product are available.

Conclusion :

All above Nubuck and suede finishing should be considered only as final cosmetic treatments. Basically, the desired effect should be achieved already during processing in the drums as far as the this is possible/in this way a negative change of the handle properties by treating the surface with excessive amounts of lustre is avoided.

Reference :

- Principles of Leather manufacture by Prof. S. S. Dutta
- Leather Technician Handbook by Prof. B. M. Das
- Possible Defects in Leather Production: Definitions, causes, consequences, remedies and types of leather by Gerhard john
- Authors 40 years of practical experience developing Nubuck and Suede Finishing.



WORLD'S FIRST HANDBAGS MADE FROM T-REX LEATHER, RECREATED WITH FOSSIL DNA, ARE COMING SOON

Scientists are unlocking prehistoric secrets to craft a material no one thought possible. A legendary creature's DNA is at the centre of a ground-breaking luxury innovation.

An extraordinary collaboration is set to revolutionize the future of sustainable fashion. *VML*, *Lab-Grown Leather Ltd.*, and *The Organoid Company* have announced a partnership to develop the world's first T-Rex leather, combining creative innovation, genomic engineering, and advanced tissue engineering.

This project aims to create a cruelty-free, eco-friendly material engineered using reconstructed Tyrannosaurus Rex DNA, representing a pioneering step for the luxury goods industry.

The new venture combines *VML Netherlands'* creative expertise, *The Organoid Company's* genome engineering leadership, and *Lab-Grown Leather's* proprietary Advanced Tissue Engineering Platform (ATEP). Together, they plan to produce a next-generation leather that could reshape luxury manufacturing while promoting sustainable practices.

Rather than using plants or synthetic materials, the process focuses on cultivating real biological structures, resulting in a product that is genetically and structurally identical to traditional leather.

Inspired by Prehistoric Resilience :

The science behind the project is as fascinating as the final product. Researchers are using fossilized collagen from 80-million-year-old T-Rex fossils as a blueprint. By engineering cells with synthetic DNA designed by *The Organoid Company* and integrating them into *Lab-Grown Leather's* Elemental-X™ product stream, they can generate authentic skin structures. Lab-Grown Leather's "scaffold-free" tissue engineering approach allows cells to form their own natural network, producing material that faithfully mirrors the properties of real leather.

Dinosaurs like the T-Rex evolved to survive extreme environmental conditions, a trait scientists believe offers valuable insight as modern ecosystems face the pressures of accelerated climate change.

Through this initiative, ancient biology becomes a model for next-generation, lab-cultivated materials that are both durable and adaptable.

Professor *Che Connon* from *Lab-Grown Leather* stated, "This venture showcases the power of cell-based technology to create materials that are both innovative and ethically sound."

Ethical and Environmental Innovation

This groundbreaking leather alternative aims to drastically reduce the environmental impacts associated with traditional leather production.

Conventional methods contribute significantly to deforestation and often involve harmful chemicals like chromium, leading to soil and water pollution.

By contrast, the T-Rex leather technology provides a pathway to eliminate animal cruelty and cut down ecological damage. The resulting Elemental Leather™ is biodegradable and maintains the same durability, repairability, and texture that consumers expect from luxury leather goods.

The project also reflects a shift toward meeting the demands of modern consumers, who increasingly prioritize environmental responsibility alongside innovation.

Unlike plant-based or synthetic leathers, Elemental Leather™ is created entirely from animal cells and proteins, offering a natural structure without external scaffolding.

According to the companies, this makes the material not just an alternative but "true leather," crafted without additives or compromises on authenticity.

Ancient Inspiration for Future Markets

Initial applications for T-Rex leather will target luxury accessories, with a flagship fashion item planned by the end of 2025. Following the launch, the partners aim to scale production for use in industries beyond fashion, including automotive and smart textiles.

With a global leather goods market projected to reach $780 billion by 2035, and bio-based materials growing at 10–15% annually, the potential for expansion is significant.

Thomas Mitchell, CEO of *The Organoid Company*, explained, "By reconstructing and optimizing ancient protein sequences, we can design T-Rex leather, a biomaterial inspired by prehistoric biology, and clone it into a custom-engineered cell line."

The project not only pushes the boundaries of synthetic biology but also demonstrates how ancient resilience can inspire sustainable innovation today.

Bas Korsten, Global Chief Creative Officer at *VML*, summed up the collaboration by stating, "With T-Rex leather we're harnessing the biology of the past to create the luxury materials of the future. This groundbreaking collaboration represents the intersection of creative innovation and cutting-edge biotechnology."

(dailygalaxy.com – 27/04/2025)

LEATHER INDUSTRY HAS GOOD OPPORTUNITY TO INCREASE EXPORTS TO US

India's total leather and leather manufactures' exports from April 2024 to February 2025 was $4.1 billion. Of this, exports to the US were $870 million, according to government data

With the US being a significant market for Indian leather goods, the reciprocal tariffs present a unique opportunity for Indian exporters to increase their market share in the world's largest market, say exporters. India's total leather and leather manufactures' exports from April 2024 to February 2025 was $4.1 billion. Of this, exports to the US was $870 million,

CM YK according to government data.

Israr Ahmed of Chennaibased Farida Group, a leading exporter of leather goods and past Vice-president, FIEO, said India will benefit as competing countries such as Vietnam, China and Cambodia have been subjected to tariffs that are at least 20 per cent higher than those of India.

However, this tariff advantage may not last longer than six nine months, as these countries are likely to reduce their rates closer to baseline levels, he said.

STRONGER PRESENCE

Indian exporters should seize this short-term opportunity to attract customers and establish a stronger presence in the US market. In the long run, this situation could also benefit India, as customers tend to diversify their supply sources to mitigate risk, thereby reducing reliance on a single country for their footwear needs.

Shiraz Askari, President, Noida based Apollo Fashion International, says that the tariff reciprocal will impact pricing and demand in the short term, but the fundamentals of the industry remain strong. India has built a robust supply chain, skilled workforce and growing capabilities in quality manufacturing, he said. The focus now should be on improving efficiency, strengthening compliance and diversifying markets to reduce overdependence on any one geography. The industry has handled disruptions before, and this is another moment that calls for smart, decisive action, he said.

According to M Abdul Wahab, Regional Chairman, CLE, and MD of the Chennai based KH Exports India Pvt Ltd, the high reciprocal tariff may lead to short term disruption of current orders, reduction and cancellations.

The focus now should be on improving efficiency, strengthening compliance and diversifying markets.

(pressreader.com – 05/04/2025)

UK LEATHER APPAREL MARKET SET TO EXPERIENCE POSITIVE CONSUMPTION TREND

The leather apparel market is anticipated to begin an upward consumption trend over the next ten years, driven by the growing demand for leather clothing in the UK. With a predicted compound annual growth rate (CAGR) of +5.3 per cent from 2024 to 2035, the market is expected to fare slightly better, reaching a volume of 1.5 million units by the end of 2035.

In terms of value, the market is expected to grow at a projected compound annual growth rate (CAGR) of +6.9 per cent between 2024 and 2035. By the end of 2035, the market is expected to be worth US $142 million (at nominal wholesale prices).

After two years of increase, the consumption of leather or composition leather clothing fell for the second consecutive year in 2024, down -12.5 per cent to 869 thousand units. In 2024, the UK's leather clothing market grew significantly to US $68 million, an 8.9 per cent increase from the year before.

About 4.8 thousand units of leather or composite leather clothing were produced in the UK in 2024, a -2.8 per cent decrease from 2023. The manufacture of leather clothing increased somewhat in value terms, reaching an expected US $807,000 in export prices in 2024.

After two years of increase, foreign purchases of leather or composition leather clothing fell by -12.3 per cent to 1.2 million units in 2024, marking the fifth consecutive year of declines. Imports of leather clothing totalled US $123 million in 2024.

With a combined 81 per cent of all imports, Pakistan (575 thousand units), India (290 thousand units), and Italy (75 thousand units) were the UK's top suppliers of leather clothing. With a combined 16 per cent, China, Turkey, Ireland, Vietnam, France, Spain, and Germany trailed somewhat.

With a combined 74 per cent share of all imports, Italy (US $48 million), India (US $27 million), and Pakistan (US $16 million) were the UK's top suppliers of leather clothing in terms of value. With a combined 20 per cent share, Turkey, France, China, Vietnam, Spain, Ireland, and Germany trailed somewhat.

(apparelresources.com – 29/04/2025)

WHAT'S NEXT FOR FOOTWEAR BUSINESSES IN A VOLATILE GLOBAL TRADE LANDSCAPE ?

We have looked at the prospects for footwear companies in light of the recent US tariffs announcements, highlighting some concerns from both a manufacturing and retail perspective.

The first weeks of April have been a rollercoaster for U.S. footwear companies. After an initial plunge triggered by President Trump's announcement of broad reciprocal tariffs, shares of major players like Nike, Deckers, Wolverine Worldwide and Foot Locker rebounded sharply following his decision to implement a 90-day pause on most measures targeting 75 key trading partners (footwearnews.com).

However, no one is out of the woods yet. The 125% reciprocal tariffs imposed by both the US and China following a sharp escalation in the trade war may have made some imports commercially unviable. What does this mean for the US footwear industry?

"It has a chilling impact", commented Matt Priest, President of FDRA, on BBC News. "On those who source products from China, particularly, it makes those types of products and the shoes that we bring in not commercially viable". According to the World Footwear 2024 Yearbook, the US imported 1.19 billion shoes from China in 2023, valued at 9.9 billion US dollars, representing a market share of 37% and a value share of 60%.

Looking At China

Yue Yuen, a leading manufacturer for global sports and outdoor brands, is sending out worrying signals. Its manufacturing revenue rose 3.5% in March, down from 14.9% growth in February. Shortly afterwards, it issued a profit warning for the year, saying it expected a decline of no more than 25% over the 100 million US dollars recorded in 2024.

Although it didn't specifically mention the impact of the tariffs, it said it was "primarily due to the negative impact on gross margin from an increase in unit footwear manufacturing costs in a volatile operating environment".

On the other hand, Forrester retail industry analyst Sucharita Kodali pointed out to Yahoo Finance that consumer pushback in China is also a big question mark. Nike, for instance, saw third quarter revenue in Greater China fall by 17% to 1.73 billion US dollars. CEO Elliott Hill assured investors that the company remains "committed to China," but concerns persist.

Skechers delivered "record" sales of 8.97 billion US dollars in 2024, up by 12.1% year-on-year. However, despite a 3% year-on-year growth in APAC, the company reported continued headwinds in China. In the final quarter of 2024, the company's sales in China fell by 11.5% to 333.5 million US dollars.

"China continues to be the challenge that, in its size and scale, gives it a disproportionate impact, particularly in the Asia Pacific region", Skechers CFO John Vandemore told investors. He guaranteed that the team "is working very diligently to address what they can in the market".

With the sneaker company set to reveal its first quarter results in a few days, UBS warns that the impact of tariffs could lead it to cut annual earnings per share guidance by 0.50 to 1.00 US dollars, raising investor concerns (finimize.com).

90-day Reprieve: What's Next?

Although imports from China to the US have fallen by more than 4.5 billion US dollars over the past five years (according to the World Footwear 2024 Yearbook), demonstrating the efforts to diversify sourcing, other questions arise when it comes to the impact of the latest tariff moves by the US administration.

Several companies have tried to reduce their reliance on Chinese manufacturing since Donald Trump took office for the first time in 2016, including Nike, Under Armour, Wolverine Worldwide and Steve Madden. However, most have moved to neighbouring countries such as Vietnam and Indonesia.

But given that the US imposed tariffs of 46% and 32% on Vietnamese and Indonesian goods, respectively, on the 2nd of April, what will happen after the 90-day reprieve? Will there be an opportunity for footwear manufacturers like Brazil or India, which have reacted cautiously to this situation? We'll have to wait and see.

(worldfootwear.com – 18/04/2025)

BANGLADESHI LEATHER FOOTWEAR EXPORTS CONTINUE TO GROW

Leather footwear exports are underpinning the positive performance of the leather industry in the fiscal year 2024-2025, according to the Export Promotion Bureau of the Government of Bangladesh.

The latest data released by the Asian country's Export Promotion Bureau shows that total leather exports between July 2024 and March 2025 amounted to 852.01 million US dollars, an increase of 9.89% over the same period of the previous fiscal year. Leather footwear exports account for about 58% of the total export value.

More specifically, in the first eight months of its current fiscal year, Bangladeshi leather footwear exports grew by 25.24%, as compared to the same period in the fiscal year 2023-2024, reaching 496.17 million US dollars.

On the contrary, between July 2024 and March 2025, leather goods exports fell by 6.11% to 256.44 million US dollars and finished leather exports fell by 6.29% to 99.40 million US dollars, on a comparable basis to the same months of the last fiscal year.

Bangladesh's other footwear exports are also on the rise. In the first eight months of its current fiscal year, exports in this segment totalled 414.68 million US dollars, an increase of 34.15% as compared to the period March 2023-July 2024.

Bangladesh Footwear Industry

According to the World Footwear 2024 Yearbook (more information available HERE), Bangladesh has emerged as one of the world's top 10 footwear producers over the past decade, with exports growing rapidly. However, in 2023, exports dropped by 25%, mainly due to a drop in US imports.

(worldfootwear.com – 15/04/2025)

Valorisation of Invasive Species For Leather, Fur, Bristle, Meat and By-Products *(Part - 28)*

Subrata Das, M.Tech (Leather Technology)
Freelance Leather Technologist & Consultant, Chennai

Wallaby

Autochthonous to much of Australia, including Tasmania, Papua New Guinea and Indonesia administered province of Papua (formerly Irian Jaya), eight presently extant species of wallabies, which are herbivorous, terrestrial marsupials, inhabit semi-arid regions with limited precipitation, unsupportive of large forests and dense vegetation.

For their repose, refuge and rapacious or relaxed rummaging, small tree, shrub, woodland and boscage dominated heterogeneous landscapes comprise ideal habitat. Some species, such as the Proserpine rock-wallaby, which is both arboreal and terrestrial, inhabit sclerophyllous forests, coastal scrub- and heath lands.

Wallabies are differentiated from kangaroos, essentially by size, shape, colour of pelage, dentition and longevity.

Of smaller built than kangaroos, wallabies have solid, compacted limbs for sprightliness and birr to negotiate woodlands and glades. In the larger marsupial, distance between the knees and the stifle joint, in the hind legs, which serve as ankles, are far longer - the "backward bending" joint below the knee (often thought to be a knee) being actually the ankle. Powerful and asymmetric hind legs complement its physique and body contours maximally.

With robust, seemingly disproportionately shaped legs which are defined for expeditiously navigating open, expansive terrain, the extent between ankles and knees of kangaroos is considerably more than that in wallabies, who's compacted, flattened limbs are more suitable for nimbleness across rocky escarpments and forest floors.

Kangaroos are designed for hopping at speeds of up to 56 kmph, clearing 7.6 m with each bound, while leaping as high as 1.8m - registering one of the most efficient locomotion on land, in the animal kingdom. Depending on the size and species, they can deliver a kick force between 3500- 9000N. On the other hand, wallabies, equally renowned for their athleticism and agility, can effortlessly attain 25 kmph, accelerating to a maximum of 48 kmph, jumping up to 4m high with each stride, all the while attaining a frequency of 3.5 strides per second.

Remarkable vestibular sense contributes to their ability to maintain balance and body posture, while traversing expansive territories in search of food and mates. Strong muscular tails

Corresponding author E-mail : katasraj@rediffmail.com

function as a counterbalance, facilitating sudden movements and sharp turns. Adapted for a plant-based diet, they use sharp teeth to grind fibrous vegetation efficiently.

An adult kangaroo can grow 2.4m tall and weigh 90 kg. Full-size wallabies are seldom seen any taller than 1.5m, from nose to tail, or heavier than 20kg, although larger size wallabies of 1.8 m, weighing up to 35 kg have been recorded.

While males of some kangaroo species have rust or maroon pelage, with an occasional burst of muted orange and brown, contrasted with bellies and faces of white, others extend in shade from light bluish to dark grey. Red Kangaroos have very fine and dense fur (resembling wool) of up to 62 fibres /mm, which provide insulation in both summer and winter. The kangaroo's coat is usually less splashy and more uniform than a wallaby's, fur, coming in a diverse range of muted colours - orange, yellow, various shades of brown, grey rust and yellow – facilitating camouflage. It does not possess distinctive markings. Wallaby pelage varies from reddish brown to grey, with some animals having distinctive darker or lighter nose, feet and tails.

With the two species foraging in different habitats, their teeth have developed to match their respective herbivory.

Kangaroos typically have a much longer lifespan than wallabies, living on average between 20 and 25 years, and in rare instances for three decades. Wallaby longevity is significantly shorter, almost by half, averaging 11-14 years. Sleeping and relaxing for the best part of the day, in backwoods nocturnal wallabies feed mostly on buds, grass, leaves and fruits. With slicing and shredding inessential to their diet, wallabies possess flat teeth, with non-prominent crowns, to masticate and crush food into a soft and pulpy mass, for easy digestion. Their keen sense of smell, almond shaped eyes and large, cuneate ears, capable of twitching 180 degrees, independent of each other, safeguard them from predatory threat.

Permanent dentition of adult kangaroos comprises of 34 teeth - 8 incisors, 8 premolars, and 16 prominently crowned molars. Although in some instances one or two miniature canines can erupt, the macropods are bereft of long pointed cusps of carnivory, necessary for biting and tearing. To forage on and masticate vegetation, wallabies have even-surfaced flat grinders, while kangaroos have recurved teeth to slice stalks of grass and reed. In each jaw, of the kangaroo, a large, outward projecting incisor assists occasional cutting requirements. These can seriously injure an opponent, predator or human by cutting through to the bone. Only the pre-molars are replaced in wallabies, with older ones, pushed to the front of the mouth, before dropping off.

An overpowering hold with strong choking constriction applied to the neck, shoulder or head of the adversary, with forelegs, while applying immense pressure, is a signature combat manoeuvre of both kangaroos and wallabies. Harnessing their sturdy tails for support and stability, they use their forelegs to grapple, wrestle, scratch, punch and scratch, and clinch fight while kicking out with their hindlegs. The dagger shaped claws can cause fatal damage and inflicting lacerations, punctures, abrasions, severe bruising, internal injuries and in some instances, death.

Several countries and regions worldwide have non-native populations of Bennett's wallabies. These are Hawaii, France, Germany, Isle of Man, Ireland, Scotland, England and New Zealand.

Hawaii

In mid-1916, three brush tailed rock wallabies - two breeding adults and a juvenile, were purchased from the Sydney Zoological Gardens, by R.H. Trenton, for his private zoo, located on Alewa Heights in Honolulu, Oahu. One night, neighbourhood dogs tore open the tent, housing the Australian imports, attacked the wallabies, and mauled the youngest to death. The surviving duo escaped into the brush of the surrounding area, where nature took its course. By 1921, a small colony was domiciled in the Ko'olau range, feeding and foraging on blackberry, guava, ulei and Christmas berry, noni, and other fruits and berries of the volcanic island.

Gradually the knee-high, mini-marsupials diffused into the Kalihi – and Halawa Valleys and Nuuanu over the years. In 1982-84, they numbered 247, with 75% beinG "Jills". Currently the Hawaiian wallabies, presumed to be around 40 in number, are confined to Kailahi, on private property, above a military base, to access which, special permission has to be sought from the US Army authorities.

The entire colony descended from the 1916 "Adam and Eve", is very shy, reclusive and skittish of humans. The Aloha State has no official management plan for the mini-marsupials as the elusive quadrupeds are confined to a small population on the ridges adjacent to Kalihi.

France

A single feral population of Bennett's Wallaby is domiciled in France. In the 1970s, between 20-25 red necked wallabies, imported from Tasmania, by Sauvage Zoological Park, located in the village of Emance, seventy kilometres southwest of Paris, escaped through compromised fencing, either due to vandalism or after a storm, into the nearby Rambouillet forest (also known as Yveline forest), spread of 200 sq km. On subsequent occasions, there were instances of 1-3 marsupials making a getaway from the reserve.

Presently, the feral, free-ranging population lives around the southern zone of the woods, between Épernon and Rambouillet. Some have migrated to Clairefontaine-en-Yvelines and Montfort-l'Amaury or Condé-sur-Vesgre, with others hopping as far as Ulis, some 40 kilometres farther east. Wayward individuals have been spotted in southwest Loire-Atlantique, Ablis, Saint -Arnault, as well. In 2017, one of the suburban train lines linking the district with Paris was delayed due to the presence of wallabies on the tracks.

Abundant and dependable food supply – buds, shoots, wild berries, foliage and frondescence, agreeable climate similar to their native Tasmania and reassuring security and shelter, hastened assimilation of the mammals into the local ecosystem. The 80-centimetre, 15 kg animals face no predatory threat, as they are too large for the foxes which inhabit Rambouillet. The reclusive, wallabies do not venture out more than 150m from the edge of the forest to forage.

According to French Wildlife regulations, wallabies – by virtue of coming under an area of uncertainty, they are neither classified as game animals nor as a pestiferous species, neither as pets nor as protected fauna - thus falling outside the four mutually exclusive categories – are banned from being hunted or trapped.

The only peril to the mini marsupial is from car collision, with 15-20 fatalities from 30-40 incidents reported annually. Since disbelieving insurance companies often harry claimants, Emance Mayor's Office, issues certificates, attesting to the presence of wallabies in the area.

According to the Rambouillet Forest Research Centre, around 150 wallabies, often misidentified by the French, as "kangourous" lived in Yveline, in 2015. However, their numbers have been steadily dwindling in the last five years, with very few being sighted now.

Germany

Small numbers of wallabies and kangaroos, imported from Australia, are said to have lived in the wild in Hesse from 1850 -1920, before being considered, by the authorities as inappropriate for native flora and fauna, and subsequently culled.

Established in 1968, the Burg Stargard Tierpark, located near Neubrandenburg, in the Mecklenburgische Seenplatte district of Mecklenburg-Vorpommern, Western Pomerania, Germany, housed eleven Bennett wallabies. On the midnight of 6/7 March, 2001, vandals released six animals, among which some were "Jills" with joeys. The escapees entered into the sprawling 0.1km wooded area surrounding the zoo. Although laborious search to secure them lasted months, and three were apprehended, all attempts to trap the remaining three failed.

With the Mecklenburg landscape, topography and vegetation, offering the them no less than the Australian bush - abundant food, ample space and acceptable weather, the herbivorous hoppers multiplied. Presently 10-15 wallabies are presumed to be living wild, in the hilly and densely overgrown area around the zoo, among a large number of oak trees. The undemanding mammals are equally at home in small gardens around Stargard Castle, finding sufficient food and shelter even during the punishing German winter.

Accounts of wallaby sightings have been received from Olsberg, which is 367 km away from Mecklenburg-Vorpommern, and also from the sparsely populated, heavily forested, temperate, rural areas of Sauerland. Reports of wallaby presence have emanated too from the neighbouring Hessen municipality of Medebach.

The vagile foragers, which seem to have adapted well to European weather, including sub-zero temperatures, are now seen within a ten-kilometre radius, feeding on grass, dry and branches. They face little or no predatory threat from raptors – hawks, vultures, kites and falcons or from mesocarnivores - jackals, foxes, raccoon dogs or wildcats.

For the moment they are in no imminent danger from humans as well – since they are not considered game in the federal hunting law – they cannot be hunted.

With the Burg Stargard Tierpark, permanently shut on 31, October, 2015 - considered prohibitive for the small town to allocate an annual subsidy of Euro 150,000 for its upkeep, the

wallabies of Germany look set to continue their feral existence indefinitely.

Since the present population is unmonitored, the exact number of Bennett's wallabies in Germany remains unknown.

Austria

On 6, October 2014, three out of seven captive Bennett's wallabies, of a Waldzell private animal collector, in the small community of Innviertler Maria Schmolln (District Braunau) of Upper Austria, broke out of their enclosure. While two were secured with alacrity, one, named Gustav, roamed around for three months, before being captured on January 28, the following year, surviving the Austrian winter successfully.

There have been several instances of runaway wallabies in Austria over the years, due to captive animals leaping over barrier fences or fleeing compromised enclosures, in various locations, such as the municipality of Gamiltz, Mühlviertel region and even Bavaria in neighbouring Germany.

As recently as in February 2023, a white wallaby escaped from its owner's residence in Deutsch-Bieling, a district of the municipality of Heiligenbrunn, in the district of Güssing., and sought refuge in a nearby forest, in the Burgenland district of Güssing. While in April 2023, making its second escape, since 2021, another rogue wallaby was spotted hopping around the town of Alberndorf im Pulkautal, in the district of Hollabrunn in Lower Austria.

Authorities are apprehensive, of runaways of Jacks and Jills coming together to start non-captive feral wallaby populations.

Netherlands and Belgium

There have been instances of "rogue" wallabies in the Netherlands, (Houten, 50 kilometres southeast of Amsterdam, Belgium (municipality of Kortenberg) and also in Oklahoma and Massachusetts, including an 18-month-old male that hopped to freedom from Stoneham Zoo., remaining fugitive for eleven days. There were multiple reports by independent sources, with no further information of where the animals came from or where they went – most likely pets which people bought impetuously, sometimes illegally and later released.

Isle of Man (IOM)

Formally declared open on 23 July, 1965, in the Isle of Man, a self-governing British Crown Dependency in the Irish Sea between Ireland and Great Britain, Curraghs Wildlife Park in The Curraghs (Ballaugh Curraghs), is situated in the north west of the Island. Administered by the Department of Environment, the park, which is owned by the Isle of Man Government, is spread over 26 acres, incorporating hay meadows, birch woodland, open water peat diggings, wildflowers, purple moor grasslands and bogs, in a wetland area. It houses about 100 primarily wetland species from around the world in walk-through enclosures.

Soon after the park's inauguration, a female red necked wallaby, named Wanda escaped its enclosure to live a free ranging life on the island, before reappearing.

The species was introduced to the 572 sq Km Island situated between Ireland and Britain, as an exotic exhibit. The oldest known record of red-necked wallabies on Manx is from a pleasure park in 1957.

Soon after its inauguration, the park procured several wallabies from Whipsnade Zoo, Bedfordshire, one among which made a getaway and evaded capture for a year. In 1989, eight animals dug under a fence and escaped. Seven were nabbed. One remained elusive.

The maiden confirmation of feral wallabies on IOM came from scientists in 1994 and the species was studied for the first time in 2008.

Today, red-necked wallabies are established, abundant and widespread in Manx, which has maritime climate and mild winters, negligible fatalities from roadkills and few foxes. The "Manx" are both protective and proud of the charismatic mascots, which bring them publicity and economic benefit in equal measure, as tourists' throng to photograph and see the wallabies, which number nearly 600, with a density of 140 every two and a half square kilometres.

Ireland

Spread over two and a half sq. km and privately owned by the Baring family of Barings bank renown since 1904, Lambay Island, is the largest island, located four km off Ireland's east coast. Its volcanic landscape is interspersed with steep coasts, deep bays and narrow inlets. In continuance of the inclination

of successive generations, towards furtherance of island ecologies and natural history, Rupert Baring, in 1950, released a number of wallabies, including hand –reared joeys, on his island paradise.

Before him, his father Cecil Baring had liberated a number of exotic avifauna on the island – kinkajous, peacocks, mouflon sheep and giant rheas. Though those exotic additions had not, the marsupials settled in well, upon finding the cool, temperate, oceanic climate, much at variance with their native Tasmania.

Sometime in the 1980s, the Baring family accepted seven wallabies from Dublin Zoo, which was labouring to resettle its surplus pouched possessions. A fishing trawler was commissioned to bring the herbivores, packed into crates, to Lambay, followed by transfer by tractor trailer to the highest point on the island. The immigrants assimilated well with the extant residents, foraging, feeding, fornicating, flourishing, filling out in numbers, in the idyllic habitat, over time, becoming feral.

The crepuscular and nocturnal animals, prefer to take up residence in and around the island's high ground - 126m Knockbane Hill, sheltering on north facing cliffs when crisper and reposing in the thick canopy of gorse bushes in fair weather. The adaptable wallabies, thrive in their new sanctuary, at home in their unconventional habitat, a five-kilometre swim away from the Irish mainland.

The non-indigenous marsupials graze on the grass which grows during the Irish summer. Hay and Silage supplement their natural diet in winter.

The population, with conspicuously thick, dense fur to cope with harsh, Irish winters, is now estimated to be in excess of one hundred. Numbers are kept under control to minimize the impact of overpopulation on the island.

Scotland

Some pet wallabies from her marital home in Hemel Hempstead, Hertfordshire, were introduced by Fiona Bryde Gore, Lady Arran Colquhoun, Countess of Arran (1918 -2013), at the end of WWII, sometime in the 1940s, on the 103-acre island of Inchconnachan, Loch Lomond in Argyll and Bute, Scotland, owned by the Colquhoun family since the 14th century and accessible by boat from the nearby village of Luss.

The wallabies have thrived on the island for close to eight decades, surviving by eating birch oak, and holly, in what is today the Loch Lomond & The Trossachs National Park. They are sufficiently resilient and nimble, to hop and bound across the frozen loch, during bitter Scottish winters and during severe winters and gambol in the woodlands of nearby smaller islands.

According a report in "The Herald" dated 7, February 2022, the new owners of the island have begun culling the wallabies, as a result of which, their present population has plummeted to 7 from the peak of 60.

England

Red-necked wallabies appear to be growing in numbers at low-population levels in England, with established breeding populations in several pockets.

Although informally imported and reported from Woburn Park, Bedfordshire and the Channel Islands, at the turn of the 20th century, the adorable and charismatic species were first exhibited at the Whipsnade Zoo in 1931, with periodic sales to other zoos and private collectors, when numbers increased beyond carrying capacity. Following serial escapes due to perfunctory fencing and indifferent maintenance, as well as wilful releases and abandonments, due to the uncertainties in wartime Britain, three small "mobs" became established - at Ashdown Forest (East Sussex), Derbyshire and at the southern end of the Pennines (Peak District). While an unspecified number of marsupials live in the first location, they were considered extirpated in the other two, due to unfavourable weather conditions. Fortuitously, a single individual was photographed in July 2009, on the Roaches grassland, in Derbyshire's Peak district.

This small colony in the Straffordshire moorlands, in south-western Peak District, is traced back to releases from Captain Henry Courtney Brocklehurst's (1888-1942) collection at The Roaches on the Staffordshire-Derbyshire border.

Mandatory closures of private zoos during WWII led to the release of Brocklehurst's five wallabies. These thrived and grew to around 50. The brutal 1963 winter, when the Peak District was snow-bound for more than sixty days, decimated the colony, sparking a slow decline, although some individuals managed to survive even in the snow. By 1985, only 14 remained; by 1995, perhaps three. Two females survived into the 2000s, the last seen in 2009. They are now presumed extirpated, though occasional sightings persist.

Today, wallaby colonies can be seen in the Chiltern Hills in the north west of London, West Sussex, Hampshire, Cornwall, Norfolk, Buckinghamshire and Kenilworth, Warwickshire. Another group survives in Leonardslee Gardens, West Sussex, where they were introduced in the 1880s.

Feral red-necked wallabies have also been reported from Kent, Devon, St Ives, and leaping over graves in London's Highgate Cemetery.

In October 2024, a wallaby was photographed near Calverton Civil Parish, Nottinghamshire, with golfers spotting another on a nearby course. Experts have concluded that multiple escapes or releases have led to serial sightings as a macropod would require 14,000 hops or more to reach parts of Nottingham.

New Zealand

Between 1858 and 1870 about 12 species of marsupial, brought across the Tasman Sea from Australia, were liberated in New Zealand, primarily by various Acclimatization Societies. Some were brought for zoos and private collections, as estate ornamentation or enrich shooting pastime recreation of the privileged.

Sir George Grey (1812 -1898) served New Zealand as Governor for two terms. He purchased Kawau Island, in the Hauraki Gulf, 45 km north of Auckland, during his second tenure (1861 -68), to convert into an island arcadia. With a keen interest in the natural sciences and in horticulture, and being an enthusiastic collector of plants and animals from around the world, for almost the entire stretch of his incumbency (1862-68), the colonial administrator, set about spending lavishly, to import and introduce many exotic and native avifauna and mammals, from the world over, kookaburras, weka, peacocks, zebras and monkeys, which roosted in and roamed the sprawling grounds, embellished by peregrine conifers and a multitude of plant species.

He also procured from Australia, between 1868 -69, brush tailed possums and five species of wallaby - Dama (or Tammar's) wallaby, Red-necked (or Bennet's) wallaby, Brushtailed Rock (or small –eared) wallaby, White throated (or Parma's) Wallaby and swamp (or black tailed wallaby) and set them free on Kawau, which survived and established populations.

The liberations were inspired by a three-fold objective to acclimatize exotic species in a scenic land, bereft of attractive and striking wildlife, to acquire and maintain target shooting, for recreation and skill, as well as to enrich the pecuniary and commercial interests of hunters, trappers and exporters. Wallabies were later released into other parts of the country for hunting.

Apart from the above, several other wallaby species, were introduced by the Acclimatisation Societies to New Zealand, most of which perished. Those which survived flourished, in the near complete absence of predatory threat.

The Canterbury region in central-eastern South Island hosts the highest wallaby density in the country. In 1870, Michael Stadholm, the first documented European settler in Waimate, released a red-necked buck and a brace of does into his estate in Te Waimate, from among several, shipped to Christchurch from Tasmania. Four years later, unspecified numbers from the growing "mob" were liberated at Hunter's Hills.

Thereafter, around 1912, a few more were surreptitiously released in the Bay of Plenty.

One hundred and sixty-seven years (1858-2025) later, the browsing mammals are all over 3500 sq km of the Grampians, the Carliston- and Twosome- mountains and Hunter's Hills areas of the administrative region.

As these macropods are known to avoid water, some rivers such as the Kaituna and Tarawera create partial barriers. However, with most streams in the Mamaku Ranges flowing through to the Waikato, their metastasis continues to be seen. Invasive Dama wallabies have also been reported from Rocky Cutting Road, Welcome Bay.

The present wallaby population of New Zealand is estimated to be in excess of a million. With New Zealand already grappling with a NZ$ 84 million annual burden due to agricultural damage by wallabies, scientists have predicted, that by 2075, the pouched pests would overrun as much as 33% of the country, if stringent population control of their burgeoning numbers is not implemented immediately.

While possums destroyed Kawau Island's pohutukawa trees, the pouched pestiferous wallabies destroyed all emerging indigenous tree seedlings with very few exceptions, the most notable exception being kanuka. For this reason, there is now no regeneration of native trees on Kawau, the present mature specimens being essentially the last generation for most.

Large areas of the Island have an almost monoculture cover of kanuka. These represent areas that were once in pasture and are the result of wallabies having driven farmers off the land by 1970, and the pasture reverting to bush under the influence of the intense wallaby browsing. Much of this land had reverted long before 1970 and had already been cut over for firewood more than once by then.

There is no understorey below the canopy, because the wallabies graze almost all vegetation, and it is common for the ground to be bare except for invasion in patches of locally significant weed species unpalatable to the wallabies.

As well as disrupting the cycle of organic matter and plant nutrients on the land the absence of a normal forest understorey leads to a short residence time for storm water and a fast run-off during heavy rain, stripping the skeletal soils and carrying significant sedimentation to the sea, where it smothers marine organisms. The sediments also compromise fresh water and habitat quality in the island's small streams and wetlands.

The loss of diversity of flora has destroyed habitat and disrupted continuity of food supply for birds through the seasons, resulting in numbers plummeting. Browsing vertebrates including the animal pests starve in dry years due to insufficient vegetation to sustain their numbers.

The present mature native trees are the last generation. They produce seed but browsing wallabies depend on the seedlings for their food supply. Possums destroy mature trees and when they fall there are no young trees to replace them because wallabies have eaten all the seedlings.

Breeding season of largely asocial, reclusive, solitary, primarily nocturnal, non –territorial, herbivorous mammals of Australia and New Zealand extends from January – February each year, corresponding to the austral summer. In the northern hemisphere, the marsupials breed and multiply around the summer solstice. While females attain sexual maturity at the end of their first year, males are capable of procreation, in 17-19 months of age. After a gestation period of 28-33 days, a single joey is born, which finds its way into the mother's pouch, to remain ensconced for nine months, before venturing out and becoming independent.

In New Zealand, the Dama and the Red necked wallaby are considered as vermin and allowed to be hunted against pre-obtained permits. The former is found in the Rotorua area (centred around Lake Tarawera) in the North Island of New Zealand. They prefer thick verdure, adjoining grassy feeding areas, in edge habitats. Found in the South Island of New Zealand, Bennett's wallabies occupy an area centred on the Hunter Hills near Waimate. Like Dama wallaby, Bennett's prefer edge habitats with appreciable vegetation cover adjacent to grass feeding areas. The two species reside in both government property and private land, for which different hunting regulations apply.

Fast and elusive when disturbed or frightened, wallabies are shot by hunters, equipped with hi-tech, thermal- and night vision paraphernalia, at medium to long distances, when they emerge to feed. Competent pest controllers have been known to score more than a hundred, during the course of a single night. Upon culling, animals are gutted, beheaded, declawed, flayed and frozen, in situ, in utility vehicles or pickups, fitted with refrigeration amenities. The head, entrails and offal are discarded for stoats, weasels, rats, feral cats and raptors to scavenge. While an average wallaby brings in NZ$7, bigger built adult animals fetch as much as NZ$20 each. A kilo of wallaby tail retails at NZ$23.18, while rumps sell at NZ$ 25.30 per kg and Topside and Porterhouse at NZ$32.20 per kg Wallaby meat dog tuckers and pet protein for both canines and felines enjoy a dedicated customer base.

Although New Zealand is a world leader in island pest eradication, a sobering reality is that wallabies have acquired plague proportions in 5000 sq km of the North Island and thrice this area in the South Island, venturing outside their containment areas in growing strength, grazing and competing with livestock, eating all the pasture with as much of impact as feral goats. Native vegetation is affected to an uncommonly high degree by the grazing habits of Dama wallabies. Diminishing containment and eradication efforts have been vandals, sneaking them out of containment areas and illegally "liberating" them into other parts of the country.

Wallaby skins, renowned for their lightness, durability and fluffiness, are very popular with interior designers as wall hangings. They are also made into baby blankets, Kaurna traditional cloaks, throws, rugs and shawls, cushions, quilts, stubby (375 ml Australian beer bottles) holders, opera and dance performance costumes, hot water bottle covers, and beer coats. Soft and strong Wallaby leather is made into eco-friendly boots, lined with ultra-luxurious wallaby fur, that keeps feet warm,

without the accumulation of sweat, because wallaby fur allows heat to dissipate. They are also used as zonker strips for fly fishing and as antimacassars and doilies, and in aborigine craft (such as the Pankalangu Bowl integrates a soft, wallaby pelt underside with a water-formed leather interior). Mounted wallaby specimens are popular as museum exhibits, home accoutrement, as well as for conducting environmental education sessions at schools, fairs, and sportsmen's gatherings.

Ugg boots, which are eco-friendly, double faced wallaby skin unisex boots with the fur layer turned inside, are made from the pouched pests of NZ. These iconic boots, which are made of sheepskin in neighbouring Australia, possess insulating properties; offer a high degree of feet comfort, enjoy excellent perspiration, oil and scuff resistance and vapour permeability. Besides its soft and smooth texture and supple feel wallaby skin Ugg boots are lightweight, durable, washable and easy to maintain.

Under strict government guidelines, which has been overseeing pest control operations of the invasive species for more than five decades, wallaby skins are obtained as a byproduct of the country's sustainable meat harvest. Approximately 2% of the numbers are culled annually to reduce macropod impact on farms and agricultural lands.

Wallabies which require 70% less water than sheep and as only 10% of that required by cattle, produce succinate as the primary end product of digestion, instead of methane, thereby circumventing greenhouse gas emissions.

Wallaby leather has also been innovatively used in scientific research to understand the olfactory mechanism of altricial neonates and their natural migration at birth from the mother's cloaca to the opening of the marsupium.

The wallaby is used, spasmodically and casually, to some extent for supplying meat but there is some difference of opinion as to the appetizing and sustaining value of macropod meat. In most cases, only the hindquarters are sold. It is sometimes difficult to transport the meat to the market from remote hunting areas. The meat is hung for several days, increasing the danger of blowfly infestation. This notwithstanding, wallaby hindquarters are sold by butchers, especially during the hunting season.

Nutritionally wallaby meat is high in protein, phosphorous, vitamins B6 and B12, protein, selenium, niacin, zinc and iron and low in fat, offering benefits such as developing lean muscle, reducing muscle loss and optimizing body weight. Flesh of the sustainably grass grazed, free ranging marsupials is lower by 42% in calorie content and 90% in saturated fat than lean beef, all the while having a high protein content of 22%. Long chain omega 3 fatty acids DHA and EPA present in the meat support heart health, whereby 65% of the daily protein requirement of an adult is adequately supplemented by a 150-gram portion.

The usual method of preparation of wallaby meat is for it to be minced, and fried with bacon, ham, potato and seasonings and served as patties. However, among early settlers' wallaby was consumed in dearth rather than in desire. Some enterprising chefs have experimented with wallaby tail soup, while some burger outlets have begun experimenting with Gourmet Sweet Chilli Wallaby Burgers featuring a homemade wallaby patty, brie, red onion and sweet chilli sauce. The delicious offering is said to be akin in taste to a lean fallow deer. Wallaby meat pies, with apple sauce. are now voguish as a tearoom snack.

Wallaby tail soup, tenderloin, and scotch are the most favoured dishes, with the soup preferred for its rich flavour and perceived health benefits. The sirloin is comparable to beef, ideal for business dining, while the scotch is seen as a comforting home-style meal. Front leg cuts, deemed too western are the least popular among oriental diners.

Expert preparation plays a key role in the meat's appeal. Southern China, particularly Hong Kong and Guangzhou, are the best markets due to culinary openness, offering strong potential for premium wallaby dishes.

"Lenah Game" boutique line of wallaby sausages, steaks, shanks, mince and charcuterie, are harvested from the cooks up just like any other red meat, but with fringe benefits - non-gamey, milder, sweeter and sustainable. They briefly supplied wallaby skins to Turkey for Russian fur coats, but the export was short lived.

Along with wallaby burgers with a side of fries, served with the usual fare of lettuce, cheese and tomato - with an egg if requested- wallaby wantons are available for diners with smaller appetites.

The near future is expected to see a wider, ethical, traceable, sustainable use of wallaby in New Zealand, hopefully, in a close loop – nose to tail.

Australia exported a record 2.24 million tonnes of red meat to 102 markets in 2024, with China remaining the top mutton importer at 95,622 tonnes. Japan ranked second for beef, though lower-value cuts gained prominence due to economic pressures. Strong demand in Korea triggered the beef safeguard early, with tariffs dropping to 8% in 2025. Meanwhile, exports beyond the US, China, and Japan grew, fuelled by rising affluence in the Middle East and Southeast Asia—regions with strong red meat traditions, presenting potential for wallaby meat.

In the UK, some landowners acquire wallabies for natural, low-maintenance, grass management. Each marsupial costs $800–$2,000, plus expenses for secure fencing and shelter. Their droppings are mulched and pulverised into natural fertilizers to enhance agricultural yield.

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This article was originaly published in Vol.- 33 No.- 01 Jan' 1985 issue of JILTA.

Economies in Leather Manufacture by Recycling Process Liquors : A Review of Possible Methods

By J. R. BARLOW
Tropical Products Institute, London*

Abstract

RECYCLING of tannery liquors, rather than rejection after a single use, is a possible means of : (a) economising on the consumption of chemicals ; (b) reducing the volume of water used ; and (c) improving the quality of effluent generated. Point (a) could be most important for many developing countries, since the majority of chemicals have to be imported and are therefore expensive. In regions suffering from water shortage, (b) and (c) could further justify the consideration of recycling methods. Possible methods for recycling liquors at different stages of processing are discussed, with emphasis on the likely benefits and on the requirements for practical implementation.

Introduction

Many developing countries are now carrying out at least part of the processing of their hides and skins, rather than exporting them in a dried or salted form.

However, although the labour costs of processing may be lower than those in developed countries, part of the financial benefit could be lost since chemicals, the majority of which have to be imported may be far more expensive. In addition, many countries experience a shortage of water and such quantities that they do possess may be required for other, more important, uses. Leather manufacture has traditionally used large volumes of water ; even a modern, efficient process needs approximately 50 litres per kg of raw hide. Therefore, the need to conserve water is a second stimulus to considering process changes. Thirdly, there is great concern to maintain or improve the standard of the environment and effluent legislation is greatly to the fore in this trend. The conversion of raw hides and skins into leather involves the use of toxic, polluting chemicals at certain stages and, as uptake of such materials is generally well below 100 per cent, considerable quantities of effluent are produced. Thus the final reason for considering economies in chemical consumption is the improvement of effluent, as it is obvious that a reduction of chemical usage should be reflected in decreased loading of tannery discharges.

Any means of reducing chemical or water consumption must not adversely affect the properties of subsequently produced leather but, with this condition in mind, the following alternatives are possible :

(1) Develop means to increase the uptake of chemicals during each process, thereby reducing wastage and allowing smaller quantities to be offered initially.

(2) Investigate ways of reusing the residual liquors of each process after suitable replenishment to the original concentration of reagents rather than discarding them.

The second of these methods is discussed in this review, since it appears more easy to introduce and to have a wider field of application than the concept of process modification.

Possible means for recycling, together with the savings resulting from such methods, are discussed for each of the major processes of leather manufacture. Details of the extra handling, analyses and equipment in practical implementation are included, in order that potential users may decide for them-

* Present address : Booth & Co (International) Ltd. Trent Bridge Leather Works, Nottingham NG2 3BT.

selves weather recycling methods are worth while in their own situation.

Preservation of raw material

Salting.

When salt is sprinkled on to a freshly flayed hide or skin, osmotic pressure is generated which withdraws water from the interior of the fibre structure. Brine is also taken up into the skins and the two effects combine to give the required stability during storage. Salt of high purity is needed as difficulties in subsequent processing can arise from the presence of even small amounts of impurities

Naturally there is some wastage of salt during the application and the excess salt then becomes contaminated with blood and water drained from the skins. Extraneous dirt and dung will also be present and will become included with the unused salt on the floor of the curing room. In time, salt-tolerant (halophilic) strains of bacteria may develop in the residual salt, adding a further source of contamination.

In regions where salt is scarce or expensive, it is likely that contaminated salt will be reused for subsequent batches of hides and skins but, as described above, this could be a risky practice Smaller skins in particular are sensitive to the damage that can result from using impure salt.

A method for the purification of used salt has recently been published (Krishnamurthi and Padmini. 1976). A saturated brine of used salt was allowed to sediment for 48 hours to remove insoluble matter. The supernatant liquor was then solar-evaporated to dryness, giving a salt of greater purity than that of the commercial salt used initially.

It may be possible to extend such a method to recover salt from the soaking liquors (see 'Soaking'). The essential steps would then be :

(1) Dissolve used salt in used soak liquor to obtain a saturated brine.

(2) Follow sedimentation and solar evaporation steps as described above.

Naturally, such methods will only be applicable to those countries having a climate suitable for solar evaporation, as the energy requirements for other forms of evaporation would be too great to make the system economically viable.

Short-term Preservation

There are several methods available for short-term preservation of hides and skins, suitable for those situations where only limited delays between flaying and processing are to be expected. The methods have been described in detail (Barlow, 1976) giving the requirements for recycling preservative liquors where appropriate.

Soaking

This process is used to restore the dried or salted hides or skins to a condition similar to that found immediately after flaying. Rehydration can take a considerable time, perticularly for material that has been sun-dried.

The usual features of soaking are :

(1) Large volumes of water, relative to the quantity of hides or skins, are used. This is necessary as the process is normally carried out in either pits or paddles.

(2) A low level of pollution of the liquor results, the main impurities being blood, dung, dirt, non-fibrous protein and salt.

(3) Due to the neutral pH and the availability of food supplies, bacterial multiplication can proceed rapidly, particularly under the warm ambient conditions likely to be found in many developing countries. Therefore it is common practice to add a bactericide, such as zinc chloride, a chlorinated phenol or sodium hypochlorite. In this case, recycling would be aimed solely at reducing the volume of water used in processing rather than to improve the quality of effluent or to reduce chemical consumption, Precautions would be needed to prevent the growth of bacteria and some form of coarse screening would also be necessary to remove particulate matter from the liquor.

Leather manufacture—description of processes and terms used

A schematic outline of the processing steps is shown in Figure 1 on next page.

If liquor has been used for the soaking of salted material, it should not be reused for further batches of hides and skins unless it is treated. Residual salt concentration in the soaked goods would increase with every cycle and subsequent processes would be adversely affected. Without incurring the need for expensive desalination or evaporation steps, a dilute brine liquor could be used in the liming, pickling or tanning processes. In liming, a saltcontent of over 3 per cent (w/v) is sometimes used to repress alkaline swelling,while in the pickling and tanning processes it is present in higher concentrations to prevent acid swelling.

In conclusion, the following points may be applicable to the recycling of soak liquors :

(1) In areas where water is rea-

Schematic Outline
Leather processing

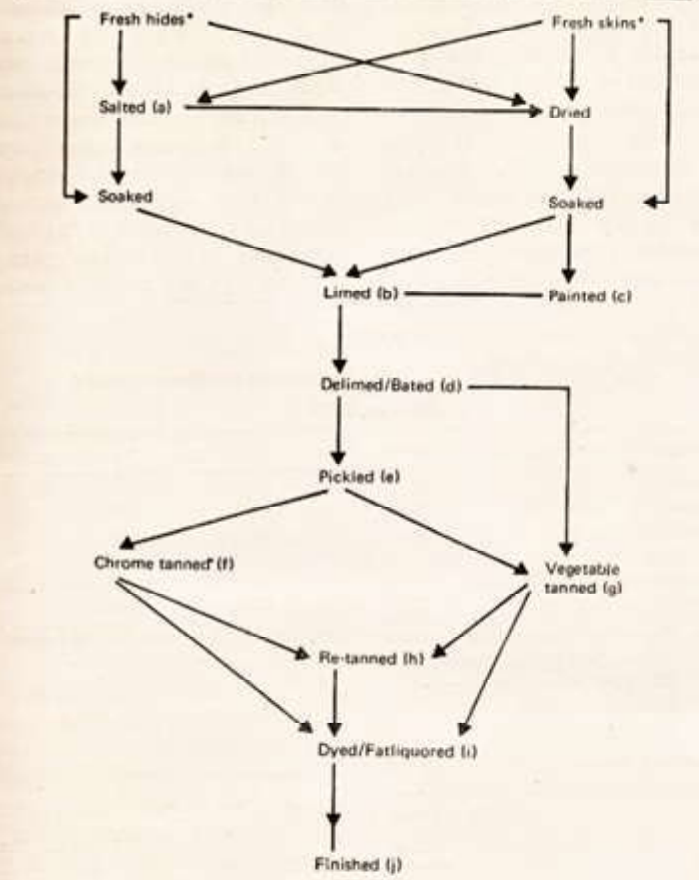


Fig. 1

Key to Figure 1

* 'Hide' is from a large animal such as a cow, camel or buffalo; 'skin' is from a smaller animal, e.g, sheep, goat or calf.

(a) Salting is a form of preservation to prevent degradation between flaying and processing.

(b) Lime and sodium sulphide are usually present. Hair is removed, the protein swells and non-fibrous material is degraded.

(c) A depilatory paint is applied to the flesh side. It penetrates into the skin, the hair roots are attacked and the wool may then be pulled out. The most commonly used materials in such paints are sodium sulphide and lime.

(d) Alkalinity is reduced by acid salts such as ammonium chloride. 'Bating' is the term used to describe the action of proteolytic enzymes, usually derived from pancreatic sources, to remove protein degraded in liming and to induce 'stretch'.

(e) Pickling is a form of preservation using salt and sulphuric acid. It is a necessary preliminary to chrome tanning but may be omitted for vegetable tanning.

(f) Chrome tanning is carried out in solutions of basic chromium sulphate. The process imparts a blue or blue/green colour to the hides or skins.

(g) Vegetable tanning involves the use of extracts from nuts, fruit or bark of certain plants and trees to give a brown leather.

(h) Retanning may be carried out to impart desired characteristics to the leather.

(i) Dyeing gives the required colour; fatliquoring is the introduction of fats and oils into the leather to give suppleness after drying.

(j) 'Finishing' is a general term used to cover a large number of chemical and physical processes applied to make the leather ready for sale. Drying, flexing, glazing and spraying with polymers would be included.

dily available, there is little incentive to consider recycling.

(2) Liquors for recycling would need filtration and settling, as well as storage in suitable vessels before further use. Handling would be difficult owing to the large volumes involved.

(3) Where salted skins have been soaked, the liquor could be reused in a subsequent step of the process, e. g. liming or pickling. A check of salt content would be needed in order that addition of correct amounts of salt could be made to give the concentration required for the subsequent process.

(4) Bactericides would be needed to avoid the multiplication of bacteria in the soak liquor between cycles.

(*See next page*)

(5) Recycling of soak liquors would be greatly simplified if fresh hides or skins were being treated, since the absence of salt would allow the liquors to be reused for soaking rather than for other stages of the process. (A similar argument applies to the reuse of soak liquors from skins which have been sun-dried.) To ensure uniformity, it would be preferable to reject a constant proportion of the soak liquor (e.g. 30 per cent) containing the majority of the particulate matter. The required volume could then be made up by the addition of fresh water.

In practical terms a system operating on this principle would require one vessel extra to requirements of throughput, into which liquors for reuse could be pumped. The soaking process could then be as shown in Figure 2.

Liming

The liming operation creats the largest quantity of pollution, in terms of suspended solids, protein, sulphide and alkalinity, of any leather-making process (see Table 1). The chemicals that are used are quite cheap, and hence the major incentive to recycling lies in the reduction of effluent loading that would result.

In the liming process, as applied to the majority of hides, lime and sodium sulphide are present. Under the highly alkaline condition, non-fibrous proteins are broken down and go into solution. Fat is released and the hide structure swells. Hydrosulphide ions, formed from the hydrolysis of sodium sulphide, attack the hair and form a number of organic, sulphur-containing breakdown products. It is clear then that the chemical composition of a used lime liquor differs from that of a freshly-prepared liquor. Indeed, it has long been a practice to include a proportion of 'mellow' (used) lime liquor to reduce plumping and to avoid excessive swell-

TABLE 1

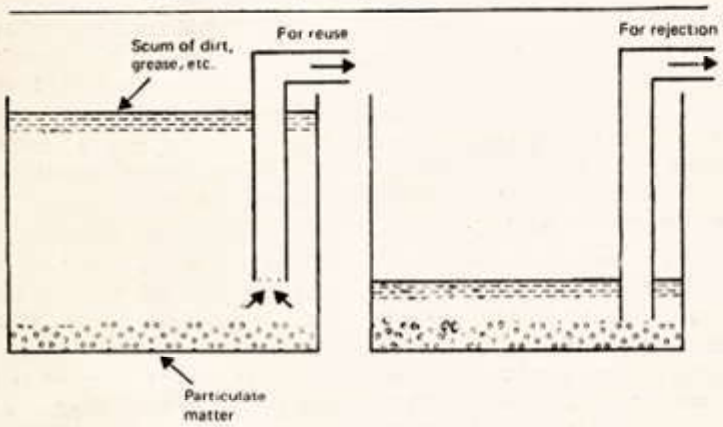
Contributions of different steps of processing to effluent loading

(Folachier, 1975)

Process	BOD (%) (a)	COD (%) (b)	Salinity (%)	Toxicity (%)
Soaking	10	15	60	0
Liming	70	55	0	80 (c)
Deliming	3	5	9	0
Pickling and chrome tanning	1	2	25-30	5 (d)

(a) Biological Oxygen Demand—measure of the amount of oxygen that the liquor extracts from the environment.
(b) Chemical Oxygen Demand— as (a).
(c) Principally sulphide.
(d) Principally chromium.

Possible methods for recycling soak liquors



1. Used soak liquor allowed to settle. Water pumped out, via filtered pipe, for reuse.
2. Remaining portion, containing the majority of dirt etc., rejected. Pumped out by unfiltered pipe.

Fig. 2

ing of the hide. Dissolved proteins act as buffering agents to limit the alkalinity of the liquor and hence to give the required action on the goods being processed. However, such methods have usually been applied on an empirical basis and have involved the rejection of a proportion of the used liquor followed by the addition of fresh lime.

More recently, there have been several studies on the recycling of lime liquors involving the replenishment of chemicals at the end of each cycle to give the required concentrations for the next batch (Simoncini *et al.*, 1972 ; Frendrup, 1973;

Money and Adminis, 1974 ; Folachier 1975). The basis of the methods reported in these studies have been similar in every case, namely that the replenishment of water, lime and sodium sulphide to the used liquor was based on analytical results. In all cases, the properties of leathers from a recycling system were not significantly different from those of leathers produced by a standard method. Money and Adminis (1974) noted that reduced swelling took place in the used-lime liquors, although equilibrium was established after five or six cycles and from then on no process differences could be seen. Some workers found that filtration of the liquor was needed between each cycle to remove hair debris and some grease, while others maintained that it was possible to directly recycle the liquor without filtration.

Table 2 shows the likely savings in chemicals resulting from the use of a recycling system.

A further possibility to reduce the chemical consumption, and to virtually eliminate lime and sulphide from the effluent, is to recycle the liquors used to wash the hides after liming. These liquors will contain some sulphide, carried over in the liquors held within the hide structure, and could be used to make up the required volume for the liming liquor. Thus the full recycling method would be as shown in Figure 3.

Recycling of lining and wash liquors

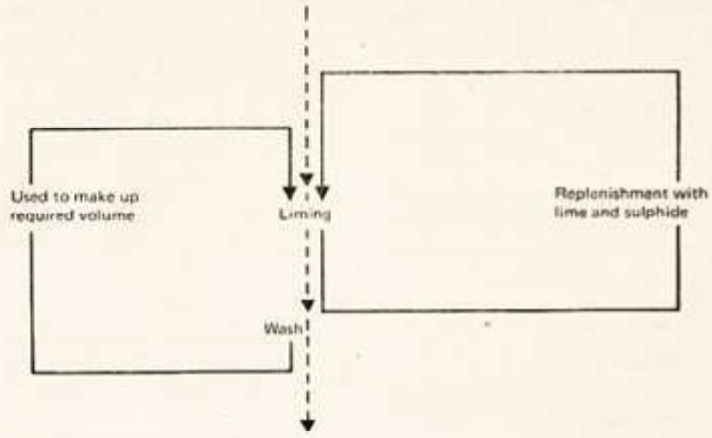


Fig. 3

Using such a system, and completely replacing the lime liquor after 20 cycles, Money and Adminis (1974) claimed 20-fold reductions in the consumption of water and in the concentration of sulphide in the effluent. In addition, there would be a seven-fold reduction in effluent lime and protein concentrations.

Methods for recycling lime liquors would involve the following steps :

1. Calculation of replenishment needs

The swelling of hides and rate of attack on hair are influenced by the concentration of sulphide in the lime liquor. Hence an analysis of sulphide in the residual liquor is needed in order that the correct amount of sulphide is added for the next batch of goods to be processed.

Lime acts as a source of alkali when sodium hydroxide, a hydrolysis product of sodium sulphide, has all been absorbed by the hide protein. However, it has a very limited solubility in water (approximately 0.2 per cent w/v at 20°C) which effectively restricts its concentration in solution. Therefore, an analysis is not needed, provided that sufficient lime is present to maintain saturation at all stages of the process.

Required measurements are therefore :

(a) Concentration of sulphide in residual liquor (= c g per litre).

(b) Volume of residual liquor (= v litres).

Weight of residual sulphide $= c \times v$ g (as sulphide ion).

$= c \times v \times \frac{78}{32}$ g as pure sodium sulphide.

TABLE 2

Percentage of chemicals per batch, based on raw hide weight (Money and Adminis. 1974)

Chemical	Standard process	Recycling process No removal solids
Sodium sulphide (%)	4.0	2.2
Lime (%)	2,0	1.5
Water (%)	200.0	40.0

Flake sulphide, the form most commonly used, contains approximately 62 per cent (w/w) as sodium sulphide. Residual sulphide is therefore equivalent to

$$c \times v \times \frac{78}{32} \times \frac{100}{62} g$$

of sulphide flake.

$= 3{\cdot}9cv$ g.

If the weight of the next batch is W kg, and sulphide (as flake) is required at 'a' per cent, the required weight of sulphide flake

$$= W \times \frac{a}{100} kg$$

$$= \frac{W \times a \times 1000}{100} g$$

$$= 10Wa \text{ g}$$

hence replenishment

$= (10Wa - 3{\cdot}9cv)$ grams of flake.

Water would also be needed to increase the residual volume to that required for the next batch. Lime would be added, probably at the rate of 1 to 2 per cent based on raw hide weight to maintain alkalinity.

2. *Practical implementation*

Recycling is well suited to pit systems, as are found in the traditional leather processing industries of many developing countries, since there is no need for the removal of liquor from the vassels. Hides are removed on completion of liming, a note is made of the residual volume of liquor (using a calibrated dipstick, for example) and a sulphide analysis is carried out. Appropriate replenishments of lime, sodium sulphide and water are then given and the next batch of hides can be processed. This method is also applicable to paddle liming where the goods can again be removed from the processing liquor. A periodic removal of grease would be advantageous in handling the limed goods and to ensure an adequate penetration of chemicals in subsequent processing.

For drum liming, it would be necessary to collect the processing liquor before the goods are removed. The facilities required have been described (Money and Adminis, 1974) and include :

(a) Rapid and efficient drainage of the processing vessel, by using a perforated, false bottom covering a drainage valve.

(b) Storage tank, large enough to hold the daily output of lime liquors and washings.

(c) Ancilary pumping and pipework with the probable inclusion of filtering for occasional removal of debris.

In conclusion, recycling of lime liquors offers great benefit to the leather producer, not only from reduction of chemical consumption but also, of more importance, by greatly improving the quality of the tannery effluent.

Washing after liming

It is customary to give hides and skins a short wash in water on completion of liming, to assist in cleaning off hair debris, epidermis and adhering particles of lime. The liquor at the end of washing will be strongly alkaline since it will contain sodium hydroxide, lime and hydrosulphide ions, all from the carried-over lime liquor. As stated above, this residual wash water may be recycled to give some of the liquor for liming, thereby greatly reducing the loading of effluent. Pumping facilities and storage vessels will be needed for such a process.

Deliming liquors

As the object of deliming is to reduce the alkalinity of the limed goods, the liquors used are either mildly acidic, neutral or slightly alkaline. At the pH range encountered, usually 5.0 to 9.0, bacteria are able to flourish and hence some form of preservation would be needed to keep recycled liquors free from contamination.

The quantities of deliming materials used are normally adjusted so that they are practically consumed by the carried-over alkalinity of the limed goods. There is little benefit to be achieved, therefore, from recycling deliming liquors from a drum process, apart from minimal reductions in water consumption, chemical consumption and effluent production. No aspects of the savings are probably sufficient to justify either capital expenditure or extra handling involved in a recycling step. (Naturally, in those regions suffering from severe shortages of water, any form of economy may be worthwhile and therefore suitable for putting into practice).

Recycling is more attractive for a pit system, where larger volumes of liquor are needed with a consequent increase in the quantity of wasted chemicals if the residual solution is discared. A method has been published dealing with the recycling of deliming liquors used in vegetable tanning (Hodgson Tanning Products, 1971). For the initial run, a solution of 2 to 3 per cent (w/v) deliming agent is prepared and acidified to pH 3-5 with dilute sulphuric acid. The goods are placed in this solution, gently agitated by rocking and the pH readjusted to 3.5 after 4 to 6 hours. After an overnight treatment, the hides are removed, 10 per cent of the liquor is drawn off and replaced by water and 0.1 per cent (based on limed weight) of deliming agent is added. Acidification to pH 3.5 is then carried out and the next batch of hides can be delimed. (It is stated that complete renewal of the deli-

ming liquor is necessary at intervals.)

Bating

As with deliming liquors, the pH conditions of bating mixtures are suitable for bacterial growth and hence any recycling scheme would need the inclusion of a suitable preservative. The effects of specific bactericides on the proteolytic enzymes of the bate would need investigation and could make recycling methods impracticable. A further drawback is the need to carry out checks of the enzyme activity for each liquor to be recycled, which requires time and skill. With the bating step of processing, simple analytical techniques do not indicate the likely activity of the enzymes on the hides and skins. Temperature and duration of storage between cycles, pH and concentration of salts are all likely to influence the enzymes present and hence affect the amount of material needed for replenishment. An additional disadvantage is that bating is carried out at elevated temperatures (30 to 37°C), which are necessary for optimum enzyme activity. If a liquor were to be stored prior to its replenishment and reuse, it would be necessary to supply heat before its addition to the next batch of hides and skins. Any reheating would need to be applied with care since localised formation of temperatures above 50 C would probably destroy enzyme activity and make the recycling step worthless. Therefore, recycling of bate liquors offers limited advantages and is likely to be difficult in practice.

Pickle liquors

In the processing of sheepskins, where pickling is generally a separate process, it is customary to recycle the liquors when the process is carried out in pits or in paddles. Determination of acidity (by titration against standard alkali to a defined pH) and salt concentration (by measurement of the specific gravity of the liquor) may be carried out to enable the replenishments to be calculated. This is a straightforward and obvious means of economising in process chemicals.

However, when the pickling process is carried out in drums, extra equipment would be needed to contain the liquors, and modifications to the drum, to allow for the required rapid drainage, would also be essential.

In the processing of cattle hides, recycling of pickle liquors is more difficult since additional chemicals, such as formic acid or calcium formate, are often added to modify (mask*) the subsequent chrome tannage. Therefore and extra analysis would be needed to enable the replenishment to be calculated, since it is important to keep a constant ratio of masking agent to chrome tanning salt. Pickling and tanning may be carried out in the same bath, without removal of either the hides or liquor. In such cases the chrome tanning salts are added directly to the pickle liquor and hence simple recycling would not be possible. The alternative approach would then be to collect the residual liquor after tanning, replenish with acid and salt, and reuse it for the pickling step of the next batch. The appropriate amount of chrome tanning salt could then be added on completion of pickling. Such a method is described under 'Chrome tanning.'

Chrome tanning

The rate of chromium consumption during conventional commercial methods of tanning is usually 70 to 80 per cent (Davis and Scroggie, 1973a). Therefore, 20 to 30 per cent of chromium is wasted, since residual liquors are usually discarded on completion of the tanning process.

In developed countries there has been a recent trend to minimise the wastage of chromium, either by modification of the tanning process or by reuse of residual liquors, with the principal objective of reducing the concentration of chromium in effluent. In developing countries, on the other hnnd, the major incentive to reduce the consumption of chrome tanning salts may lie in the resultant savings in the cost of the chemicals. Chrome tanning salts (as a powder containing 25 per cent Cr_2O_3) cost approximately £410 per tonne in the UK (February 1981) but are likely to be far more costly in those developing countries that have to import such compounds. Any ways of economising in their use, without having adverse effects on the leather produced, are therefore of considerable importance.

Some reduction in the rate of wastage can be gained by using smaller volumes of liquor in the processing vessels and hence effectively increasing the concentration of chemicals present. The use of more basic complexes will also increase the fixation of chromium, but a compromise is needed between reduction of wastage and retention of the desirable properties of the leather. Recent papers have described methods for increasing chrome uptake to almost 100 per cent (Gauglhofer. 1975) but such processes include the use of specialised tanning techniques and require considerable expertise.

An alternative approach is the

*For an explanation of masking see 'Chrome tanning'.

recycling of chrome tanning liquors. Before discussing possible methods for recycling chrome tanning liquors, it is necessary to appreciate some of the chemical changes and their effects on the reaction between tanning salt and hide protein that can take place during and between processing cycles. Three terms that will be used in subsequent discussions are basicity, masking and neutral salts. For the sake of those unfamiliar with tanning terms, these are described below.

Basicity : Basicity, expressed as a percentage, indicate the proportion of total bonding from the chromium atom that is satisfied by hydroxyl groups. Thus chromic chloride, $CrCl_3$, is 0 per cent basic, $Cr(OH)Cl_2$ is 33 per cent basic. In practical terms, the reactivity of chromium salts towards hide protein increases as basicity increases. It is normal practice to use a tanning salt of 33 per cent basicity in the initial stages of tanning, for at this level the chromium salts are only moderately reactive and therefore penetrate the full thickness of the skin. Once penetration is complete, dilute alkali is slowly added to increase the basicity of the tanning salts and thereby induce stronger bonding to the hide. Thus the residual liquor, after basification, will have different tanning properties compared to those of the initial solution.

Masking : Masking is the introduction of substances into the chromum complex to lower the reactivity of the latter and hence to modify both the tanning process and the properties of subsequently produced leather. Organic acids, such as lactic, forming or acetic, are most commonly used and may be added to the prior pickle liquor. The properties they impart include :

Tannage
- (a) Reduced astringency.
- (b) Increased resistance to precipitation by alkali.
- (c) Increased penetration rate of tanning salt.

Leather
- (a) More uniform distribution of chromium.
- (b) Improved smoothness.
- (c) Greater thickness.

It is clear that the ratio of masking agent to chromium salt should be kept constant, in order that consistent results are obtained.

Neutral salts : During the manufacture of most chrome tanning salts used commercially, sodium sulphate is formed and remains in the liquor or solid as applied. It has long been known that the uptake of chrome tanning salts by hide protein is adversely affected by the presence of such neutral salts (Wilson, 1941). Hence a constant concentration is needed to ensure regularity in tanning on a batch-to-batch basis. In normal processing, it is easy to control the neutral salt content of the tanning liquor as it will be the sum of that used in the pickle liquor (if carried over) and that introduced from the tanning salt. With a recycling system, however, it is necessary to measure the salt content for each run and to make the necessary corrections to maintain a constant concentration.

Possible methods for recycling chrome tanning liquors are shown in Figure 4. Details of these methods are described below.

Direct methods

Method 1. (Davis and Scroggie, 1973b, c ; Folachier, 1975).

The residual tanning liquor was replenished with an appropriate amount of chromium salts and reused for the next batch of hides or skins. It was therefore necessary to carry out separate pickling and tanning steps, with the liquor from the former being discarded. In both laboratory and commercial-scale trials, recycling was seen to be feasible and to produce leathers of a quality comparable to that of leathers from a standard process. The residual liquor from each tanning batch was analysed for chromium and the appropriate amount of tanning salt added for the next cycle. For basification, sodium carbonate was used, with the weight being in proportion to the weight of added chrome tanning salt. No additional neutral salt was used and it was found that the concentration of sodium chloride (from carried over pickle liquor contained in the interfibrillary spaces of the hides) and sodium sulphate soon reached equilibrium. Approximately 25 per cent less of chrome tanning salt was needed to produce leathers having satisfactory chemical and physical properties, with the added benefit of considerable reductions in the chromium and neutral salt content of the effluent.

Method 2. (Davis and Scroggie, 1973 d, e; Barlow, 1977).

The residual liquor from chrome tanning was replenished with acid and (possibly) salt and used as the pickle liquor for the next batch of hides or skins At the end of the pickle step, the appropaiate amount of chromium salt was added to the same liquor and tanning proceeded. As with method 1, the amount of alkali used for basification was proportional to the added weight of chromium salt. The amount of sulphuric acid added after each cycle was the same as that of a standard process, but the amount

Possible methods for recycling chrome tanning liquors

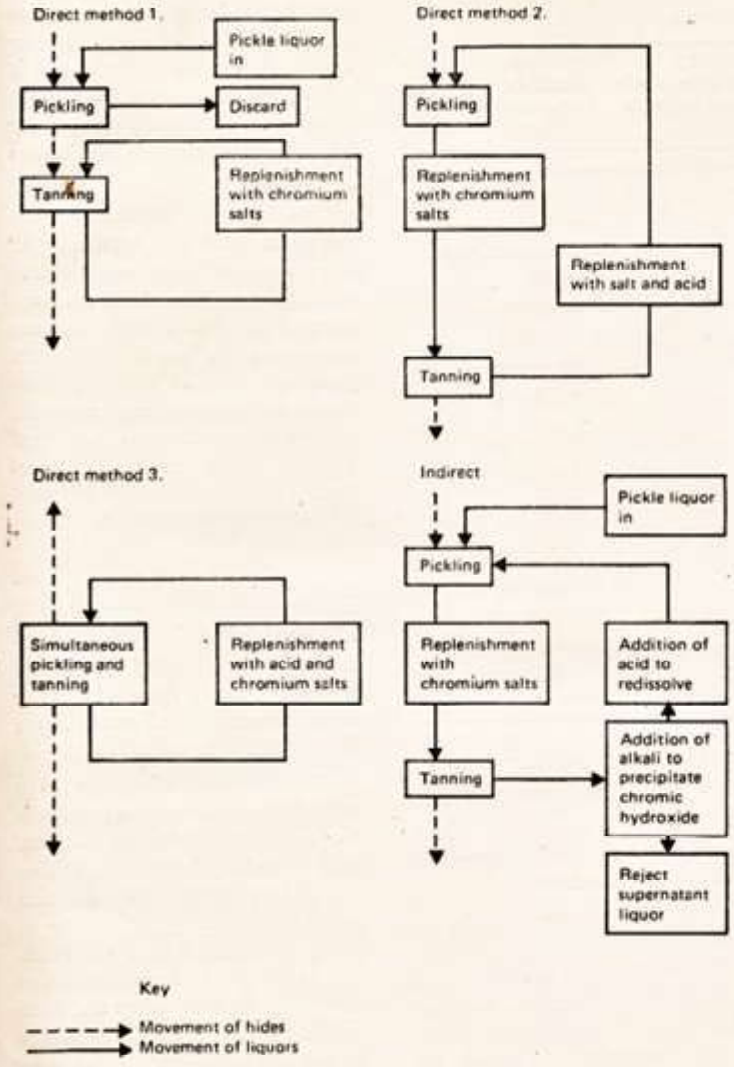


Fig. 4

of formic acid was reduced by 20 per cent, in order to give standard masking for each cycle. It was found that the equilibrium salt content, brought about by the introduction of sodium sulphate from the tanning salt, was sufficient to prevent acid swelling during pickling. Leather properties were not adversely affected by the recycling process, consumption of tanning salt was reduced by 22 per cent and further economies were seen in the lower quantities of neutral salts required for pickling. Wet blues thus produced had storage stability equal to that of leathers from a conventional (non-recycling) process, and batch-to-batch colour differences were minimal (Barlow, 1977).

Method 3. (France, 1976).

Simultaneous pickling and tanning have been described, using a mixture of organic acids for the former part of the combined process. Such compounds, marketed as a proprietary product specifically designed for pickling hides and skins, serve the two following purposes. They penetrate the hide or skin structure rapidly, thereby reducing the tendency for the chromium salts to precipitate on the surface of a mildly alkaline delimed hide or skin. They mask the chromium salts, further reducing the tendency for deposition and giving rapid, uniform penetration of tanning agent.

The method used was as follows (starting from washed ; bated stock) :

(1) Drum for 5 minutes with salt (2 per cent on weight of bated goods).

(2) Add replenished pickle/tanning liquor while drum turning.

(3) No basification required.

(4) Remove goods, collect residual liquor.

(5) Analyse acid and chromium contents of spent liquor, replenish for next batch and store liquor for 24 hours before reuse.

Table 3 summarises the different aspects of the three direct recycling methods.

Indirect methods

Chromium was precipitated from the residual liquor, in the form of chromic hydroxide, by the addition of alkali and was then removed by

TABLE 3

Comparison of different methods for the direct recycling of chrome tanning liquors

Property	*Method 1* Reuse as separate tanning liquor	*Method 2* Reuse as pickle liquor for next batch	*Method 3* Reuse in simultaneous pickling (tanning)
Utilisation of chromium salts	← Similar →		
Neutral salt content of tanning liquor	← Similar →		(lower quantities possible)
Control of pickling	Standard process	← Analysis to determine replenishment needs →	
Wastage of pickle acid	Wasted, unless separate recycling system used	← Recycled →	
Handling of goods	Separate pickling and tanning processes not generally favoured for hides	← More acceptable on commercial scale →	
Others	—	—	Publish method only describes use of proprietary pickling compound
	← Occasional filtration suggested →		

filtration. The solid was then redissolved in sulphuric acid to give a chrome tanning liquor ready for reuse. This method was used in the USA during the Second World War but has been further developed more recently (Langerwerf *et al.*, 1975). The method found to give the best precipitation characteristics was as follows :

(1) Collect and mix residual liquors from tanning, neutralisation, retanning and washing processes, measure volume and determine concentration of chromium.

(2) Add calculated amount of magnesium oxide. Calculated to give a pH of 8.0 to 9.0 ; approximately 440 g per kg of Cr_2O_3 (assuming that basicity of chromium in waste liquors equals 50 per cent).

(3) Drum liquor and magnesium oxide for 1 hour, allow to settle overnight.

(4) Syphon off supernatant liquor and discard.

(5) Dissolve precipitate in calculated amount of concentrated sulphuric acid* to give reusable liquor of known concentration and basicity.

(6) Replenish with chrome tanning salt ready for use on next batch of goods.

The main purpose of the reported trials was the reduction of chromium in effluent, although the corresponding reduction in chemical consumption would also be financially attractive. For example, for a tannery processing 2.5 tonnes of hides per day, the reduction in the consumption of chrome tanning salt would be approximately 12.5 tonnes per annum.

However, considerable apparatus would be needed, together with extra handling, analyses and chemical additions. Thus the direct recycling of chrome tanning liquors, rather than the more complicated procedures involved with precipitation and redissolving methods, appears more attractive and less likely to create problems in practice.

*Calculated to give standard pH of solution and known basicity of complex. (Approximately 1.3 kg of concentrated sulphuric acid needed per kg of Cr_2O_3 for reduction of basicity from 100 per cent to 33 per cent.

Conclusions

Simple methods of reducing the consumption of both chemicals and of water, with corresponding decreases in the loading and volume of effluent, are of interest to leather manufacturers in all parts of the world.

Considerable effort has been expended on developing methods for recycling processing liquors, after suitable replenishment, to give the results summarised in this article. In developing countries it is imperative that potential methods should not involve large amounts of capital expenditure, whilst the skills needed for sophisticated apparatus or methods of operation may also be in short supply. However, in general the recycling processes discussed do not need expensive plant or high orders of skill for their successful use, yet they could give appreciable savings in the cost of converting hides and skins into leather.

In the future it is likely that effluent legislation will become more

comprehensive and will necessitate the reduction of wastage from many of the leather-making processes. It is usually far more economical to redesign a process to make more efficient use of the chemicals present, rather than to build treatment facilites for reducing the loading of effluent produced.

Naturally, certain processes and processing vessels lend themselves to recycling more than others, good examples being the 'concrete mixer' type of hide processing equipment. Rapid drainage and pumping facilities are such that the liquors can readily be separated from the goods and transported to a co lection vessel for analysis and replenishment. With drums, on the other hand, it would be necessary to fit perforated false bottoms or sides for drainage, with some form of collection pit, sump, pump and collection tank for handling the residual liquors. However, with the resultant savings in expensive chemicals and effluent loading, it is likely that the moderate investment needed for such facilities would be regained within a short period.

Pits or paddles are suitable for recycling methods, provided that excess capacity is available to accommodate the liquors between cycles.

Recycling of lime liquors offers the greatest potential savings in effluent loading but is of less interest in terms of chemical savings. Recycling of chrome tanning liquors results in a considerable reduction of chemical consumption and, as such chemicals are perticularly expensive in developing countries that do not have local sources, well worth investigating. Furthermore, the stringent effluent restrictions on heavy metal contents, now being implemented in many developed countries, are likely to become more widely accepted and hence to enforce all possible means for economy of tanning salts. Sufficient data are already available to enable commercial scale recycling of chromium liquors to be carried out with little extra handling or analyses compared to those required in a conventional process.

It will be to the benefit of all developing countries to practise methods for reducing chemical consumption and effluent production, both for the shorterm improvement of profitability and in longer-term aims to control environmental pollution.

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Waste Audit

(Part - 2)

Dr. Goutam Mukherjee

Govt. College of Engineering & Leather Technology, Kolkata

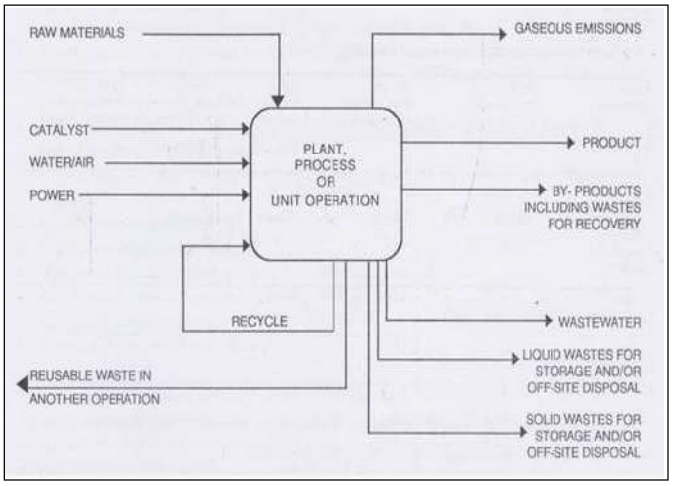
PHASE 2 :

MATERIAL BALANCE : PROCESS INPUTS AND OUTPUTS

A material balance may be defined as a precise account of the inputs and outputs of an operation.

This phase describes a procedure for the collection and arrangement of input and output data. The procedure can be applied to derive the material balance of a plant, a process or a unit operation. Figure 2 is an example of a set of components that need to be quantified to derive a material balance. Note that infrequent outputs (e.g., the occasional dumping of an electroplating bath) may be as significant as continuous daily discharges.

Figure 2 : Typical Components of a Material Balance



The discussion uses unit operations to illustrate the waste audit procedure.

Although the procedure is laid down in a step-by-step fashion it should be emphasized that the output information can be collected at the same time or before the input data; it is up to we to organize our time efficiently.

Step 4 : Determining Inputs

Inputs to a process or a unit operation may include raw materials, chemicals, water, air and power (Figure 2). The inputs to the process and to each unit operation need to be quantified.

As a first step towards quantifying raw material usage, examine purchasing records; this rapidly gives we an idea of the sort of quantities involved. In many situations the unit operations where raw material losses are greatest are raw material storage and transfer. We should look at these operations in conjunction with the purchasing records to determine the actual net input to the process.

Make notes regarding raw material storage and handling practices. Consider evaporation losses, spillages, leaks from underground storage tanks, vapour losses through storage tank pressure-relief vents and contamination of raw materials. Often these can be rectified very simply.

Record raw material purchases and storage and handling losses in a table in order to derive the net input to the process (Table 3).

Table 3 : Raw Material Storage and Handling Losses

Raw Material	Qty of Raw Material	Qty of Raw Material Purchased (per annum)	Type of Storage Used in Production (per annum)	Average Length of Storage	Estimated Annual Raw Material Losses
Raw Material 1 (Surface Treatment Chemical)	100kg	95kg	Closed	1 month	5kg
Raw Material 2					
Raw Material 3					

Once the net input of raw materials .to our process has been determined we should proceed with quantifying the raw material input to each unit operation.

If accurate information about raw material consumption rates for individual unit operations is not available then we will need to take measurements to determine average figures.

Corresponding author E-mail : gmclt@hotmail.com / gmgcelt@gmail.com

Measurements should be taken for an appropriate length of time. For example, if a batch takes one week to run, then measurements should be taken over a period of at least three weeks; these figures can be extrapolated for monthly or annual figures.

Some quantification is possible by observation and some simple accounting procedures.

- For solid raw materials, ask the warehouse operator how many sacks are stored at the beginning of the week or prior to a unit operation; then ask him again at the end of the week or unit operation. Weigh a selection of sacks to check compliance with specifications.
- For liquid raw materials such as water or solvents, check storage tank capacities and ask operators when a tank was last filled. Tank volumes can be estimated from the tank diameter and tank depth. Monitor the tank levels and the number of tankers arriving on site.

While investigating the inputs, talking to staff and observing the unit operations in action, the waste audit team should be thinking about how to improve the efficiency of unit operations. Consider the following questions.

- Is the size of the raw material inventory appropriate to ensure that material-handling losses can be minimized ?
- Transfer distances between storage and process or between unit operations - could these be reduced to minimize potential wastage ?
- Do the same tanks store different raw materials depend on the batch product? Is there a risk of cross-contamination ?
- Are sacks of materials fully emptied or is some material wasted ?
- Are viscous raw materials used on site - is it possible to reduce residual wastage in drums ?
- Is the raw material storage area secure ? Could a building be locked at night, or could an area, be fenced off to restrict access ?
- How could the raw materials be protected from direct sunlight or from heavy downpours ?
- Is dust from stockpiles a problem ?
- Is the equipment used to pump or transfer materials working efficiently ?
- Is it maintained regularly ?
- Could spillages be avoided ?
- Is the process adequately manned ?
- How could the input of raw materials be monitored ?
- Are there any obvious equipment items in need of repair ?
- Are pipelines self-draining ?
- Is vacuum pump water re-circulated ?

The energy input to a unit operation should be considered at this stage; however, energy use deserves a full audit in its own right. For waste auditing purposes make a note of the energy source and whether waste reduction could reduce energy costs. If energy usage is a particularly prominent factor maybe we should recommend that an energy audit be undertaken.

Input data should be recorded on our process flow diagram or in tabular form as shown in Table 4. Water is frequently used in the production process, for cooling, gas scrubbing, washouts, product rinsing and steam cleaning. This water" usage needs to be quantified as an input.

Some unit operations may receive recycled wastes from other unit operations. These also represent an input.

Steps 5 and 6 describe how these two factors should be included in our waste audit.

Table 4 : Input Data

Unit Operation	Raw Material 1 (m^3/annum)	Raw Material 2 (tonnes/annum)	Water (m^3/annum)	Energy Source
Surface Treatment (A)				
Rinse (B)				
Painting (C)				
Total Raw Material Used in All Unit Operations				

Step 5 : Recording Water Usage

The use of water, other than for a process reaction, is a factor that should be covered in all waste audits. The use of water to wash, rinse and cool is often overlooked, although it represents an area where waste reductions can frequently be achieved simply and cheaply.

Consider these general points about the site water supply before assessing the water usage for individual units.

- Identify water sources ? Is water abstracted directly from a borehole, river or reservoir; is water stored on site in tanks or in a lagoon ?
- What is the storage capacity for water on site ?
- How is water transferred - by pump, by gravity, discuss only ?
- Is rainfall a significant factor on site ?

For each unit operation consider the following.

- What is water used for in each operation ? Cooling, gas scrubbing, washing, product rinsing, dampening stockpiles, general maintenance, safety quench etc.
- How often does each action take place ?
- How much water is used for each action ?

It is unlikely that the answers to these questions will be readily available - we will need to undertake a monitoring programme to assess the use of water in each unit operation. Again, the measurements must cover a sufficient period of time to ensure that all actions are monitored. Pay particular attention to intermittent actions such as steam cleaning and tank washouts; water use is often indiscriminate during these operations. Find out when these actions will be undertaken so that detailed measurements can be made.

Record water usage information in a tabular form - ensure that the units used to describe intermittent actions indicate a time period (Table 5).

Table 5 : Water Usage

	Cleaning	Steam	Cooling	Other
Unit Operation A				
Unit Operation B				
Unit Operation C				
All measurements in standard units, for example m^3/annum or m^3/day.				

Using less water can be a cost-saving exercise. Consider the following points while investigating water use :

- tighter control of water use can reduce the volume of wastewater requiring treatment and result in cost savings - in the extreme, it can sometimes reduce volumes and increase concen□trations to the point of providing economic material recovery in place of costly wastewater treatment;
- attention to good house-keeping practices often reduces water usage and, in turn, the amount of wastewater passing to drain;
- the cost of storing wastewater for subsequent reuse may be far less than the treatment and disposal costs;
- counter-current rinsing and rinse water reuse are highlighted in the case studies as useful tips for reducing water usage.

Step 6 : Measuring Current Levels of Waste Reuse / Recycling

Some wastes lend themselves to direct reuse in production and may be transferred from one unit to another (e.g., reuse of the final rinse in a soft-drink bottle washing plant as the initial rinse); others require some modification before they are suitable for reuse in a process. These reused waste streams should be quantified.

If reused wastes are not properly documented double-counting may occur in the material balance particularly at the process or complete plant level; that is, a waste will be quantified as an output from one process and as an input to another.

The reuse or recycling of wastes can reduce the amount of fresh water and raw materials required for a process. While looking at the inputs to unit operations think about the opportunities for reusing and recycling outputs from other operations.

Summary of steps 4, 5 and 6

By the end of Step 6 we should have quantified all our process inputs.

The net input of raw materials and water to the process should be established having taken into account any losses incurred at the storage and transfer stages.

Any reused or recycled inputs should be documented. All notes regarding raw material handling, process lawet, water losses, obvious areas where problems exist should all be documented for consideration in Phase 3.

Step 7 : Quantifying Process Outputs

To calculate the second half of the material balances the outputs from unit operations and the process as a whole need to be quantified.

Outputs include primary product, by-products, wastewater, gaseous wastes (emissions to atmosphere), liquid and solid wastes which need to be stored and/or sent off-site for disposal and reusable or recyclable wastes (Figure 2). We may find that a table along the lines of Table 6 will help we organize the output information. It is important to identify units of measurement.

Table 6 : Process Outputs

Unit Operation Liquid	Product	By-Product Waste to be reused	Waste water emissions	Gasoeus Wastes	Stored Solid Wastes Off-Site	Coding	Other
Unit Operation A							
Unit Operation B							
Unit Operation C							
Total							

The assessment of the amount of primary product or useful product is a key factor in process or unit operation efficiency.

If the product is-sent off-site for sale, then the amount produced is likely to be documented in company records. However, if the product is an intermediate to be input to another process or unit operation then the output may not be so easy to quantify. Production rates will have to be measured over a period of time. Similarly, the quantification of any by-products may require measurement.

Hints on how to approach the quantification of wastewater, gaseous emissions and wastes for off-site removal are described in Steps 8, 9 and 10.

Step 8 : Accounting for Wastewater

On many sites significant quantities of both clean and contaminated water are discharged to sewer or to a watercourse. In many cases, this wastewater has environmental implications and incurs treatment costs. In addition, wastewater may wash out valuable unused raw materials from the process areas. Therefore, it is extremely important to know how much wastewater is going down the drain and what the wastewater contains. The wastewater flows, from each unit operation as well as from the process as a whole, need to be quantified, sampled and analyzed.

Here are some suggestions on how to carry out a thorough survey of wastewater flows on our site.

- Identify the effluent discharge points; that is, where does wastewater leave the site? Waste-water may go to an effluent treatment plant or directly to a public sewer or watercourse. One factor that is often overlooked is the use of several discharge points - it is important to identify the location, type and size of all discharge flows.
- Identify where flows from different unit operations or process areas contribute to the overall flow. In this way, it is possible to piece together the drainage network for our site. This can lead to startling discoveries of what goes where!
- Once the drainage system is understood it is possible to design an appropriate sampling and flow measurement programme to monitor the wastewater flows and strengths from each unit operation.
- Plan our monitoring programme thoroughly and try to take samples over a range of operating conditions such as full production, start up, shut down and washing out. In the case of combined storm water and wastewater drainage systems, ensure that sampling and flow measurements are carried out in dry weather.
- For small or batch wastewater flows it may be physically possible to collect all the flow for measurement using a pail and wristwatch. Larger or continuous wastewater flows can be assessed using flow measurement techniques.

The sum of the wastewater generated from each unit operation should be approximately the same as that input to the process. As indicated in Step 6, note that double-counting can occur where wastewater is reused. This emphasizes the importance of understanding our unit operations and their interrelation-ships.

The wastewater should be analyzed to determine the concentration of contaminants.

- We should include wastewater analyses such as pH, chemical oxygen demand (COD), biochemical oxygen demand (BOD_5), suspended solids and grease and oil.

- Other parameters that should be measured depend on the raw material inputs. For example, an electroplating process is likely to use nickel and chromium. The metal concentrations of the wastewater should be measured to ensure that the concentrations do not exceed discharge regulations, but also to ensure that raw materials are not being lost to drain. Any toxic sub stances used in the process should be measured.
- Take samples for laboratory analysis. Composite samples should be taken for continuously - running wastewater. For example, a small volume, 100 ml, may be collected every hour through a production period of ten hours to gain a 1 litre composite sample. The composite sample represents the average wastewater conditions over that time. Where significant flow variations occur during the discharge period, consideration should be given to varying the size of individual samples in proportion to flow rate in order to ensure that a representative composite sample is obtained. For batch tanks and periodic drain down, a single spot sample may be adequate (check for variations between batches before deciding on the appropriate sampling method).

Wastewater flows and concentrations should be tabulated (as per Table 7).

Table 7 : Wastewater Flows

	Discharge to Public Sewer		Stormwater Drain		Reuse		Storage		Total Wastewater Output	
Source of Wastewater	Flow	Conc'n	Flow	Conc'n	Flow	Conc'n	Flow	Conc'n	Flow	Conc'n
Unit Operation A										
Unit Operation B										
Unit Operation C										
Flows in m^3/d; concentrations of contaminants of concern in mg/l										

Step 9 : Accounting for Gaseous Emissions

To arrive at an accurate material, balance some quantification of gaseous emissions associated with our process is necessary. It is important to consider the actual and potential gaseous emissions associated with each unit operation from raw material storage through to product storage.

Gaseous emissions are not always obvious and can be difficult to measure. Appendix 1 outlines a possible method of measuring gaseous emissions through vents using a bag orifice. Where quantification is impossible, estimations can be made using stoichiometric information. The following example illustrates the use of indirect estimation.

Consider coal burning in a boiler house. The auditor may not be able to measure the mass of sulphur dioxide leaving the boiler stack due to problems of access and lack of suitable sampling ports on the stack. The only information available is that the coal is of soft quality containing 3% sulphur by weight and, on average, 1000 kg of coal is burnt each day.

First calculate the amount of sulphur burned :

1000 kg coal x 0.03 kg sulphur/kg coal = 30 kg sulphur/day.

The combustion reaction is approximately :

The number of moles of sulphur burned equals the number of moles of sulphur dioxide produced. The atomic weight of sulphur is 32 and the molecular weight of sulphur dioxide is 64. Therefore :

kg-moles S = 30 kg/32 kg per kg-mole = kg-mole of SO_2 formed

kg SO_2 formed = (64 kg SO_2/kg-mole) x kg-moles SO_2 = 64x 30/32 = 60 kg

Thus, it may be estimated that an emission of 60 kg sulphur dioxide will take place each day from the boiler stack.

Record the quantified emission data in tabular form and indicate which figures are estimates and which are actual measurements.

The waste auditor should consider qualitative characteristics at the same time as quantifying gaseous wastes.

- Are odours associated with a unit operation ?
- Are there certain times when gaseous emissions are more prominent - are they linked to temperature ?
- V Is any pollution control equipment in place ?
- Are gaseous emissions from confined spaces (including fugitive emissions) vented to the outside ?
- If gas scrubbing is practiced, what is done with the spent scrubber solution? Could it be converted to a useful product ?
- Do employees wear protective clothing, such as masks ?

Step 10 : Accounting for Off-Site Wastes

Our process may produce wastes which cannot be treated on-site. These need to be transported off-site for treatment and disposal. Wastes of this type are usually non-aqueous liquids, sludges or solids. Often, wastes for off-site disposal are costly to transport and to treat. Therefore, minimization of these wastes yields a direct cost benefit.

Measure the quantity and note the composition of any wastes associated with our process which need to be sent for off-site disposal. Record our results in a table (see Table 8).

Table 8 : Wastes for Off-site Disposal

	Liquid		Sludge		Solid	
Unit Operation	Qty	Compositon	Qty	Composition	Qty	Composition
Unit Operation A						
Unit Operation B						
Unit Operation C						
Quantities in m^3/annum or t/annum						

We should ask several questions during the data collection stage.

- Where does the waste originate ?
- Could the manufacturing operations be optimized to produce less waste ?
- Could alternative raw materials be used which would produce less waste ?
- Is there a particular component that renders the whole waste hazardous - could this component be isolated ?
- Does the waste contain valuable materials ?

Wastes for off-site disposal need to be stored on-site prior to dispatch. Does storage of these wastes cause additional emission problems ? For example, are solvent wastes stored in closed tanks ? How long are wastes stored on-site ? Are stockpiles of solid waste secure or are dust storms a regular occurrence ?

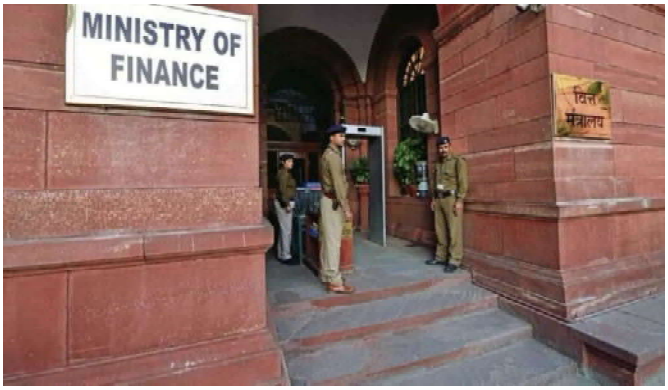
Summary of Steps 7, 8, 9 and 10

At the end of Step 10 the waste audit team should have collated all the information required for evaluating a material balance for each unit operation and for a whole process.

All actual and potential wastes should be quantified. Where direct measurement is impossible, estimates based on stoichiometric information should be made. The data should be arranged in clear tables with standardized units. Throughout the data collection phase, the auditors should make notes regarding actions, procedures and operations that could be improved.

.....To be continued in the next issue

FINANCE MINISTRY RELEASES DRAFT FRAMEWORK FOR DEVELOPING CLIMATE FINANCE TAXONOMY



The Department of Economic Affairs (DEA), under the Ministry of Finance, has prepared a draft framework to develop 'India's Climate Finance Taxonomy'. The draft, released for public review on Wednesday, outlines the approach, objectives, and principles that will guide the taxonomy, an official release said.

"It also details the methodology for classifying activities, projects, and measures that contribute to India's climate commitments, while also taking into account goals associated with achieving 'Viksit Bharat' by 2047," it said. The DEA has sought comments on the framework till June 25, following which the official framework will be released.

India's climate finance taxonomy aims to facilitate greater resource flow to climate-friendly technologies and activities, enabling the country to achieve the vision of being 'net zero' by 2070 while also ensuring long-term access to reliable and affordable energy. "The Climate Finance Taxonomy will serve as a tool to identify activities consistent with a country's climate action goals and transition pathway," the release said.

India's climate ambitions are reflected through the Nationally Determined Contributions (NDCs) and the announcement of net zero emissions by 2070, the draft said. India requires around $2.5 trillion (at 2014-15 prices) to meet the NDC targets till 2030. As per NITI Aayog, the total investment required for energy transition is estimated at $250 billion per year till 2047.

Finance for adaptation action is, therefore, vital for addressing climate change impacts, building resilience and achieving India's development goals. Preliminary estimates indicated that about $206 billion (at 2014-15 prices) would be required from 2015 to 2030 to implement adaptation actions in agriculture, forestry, fisheries, infrastructure, water resources and ecosystems, the draft said.

At present, India's energy consumption per capita is about one-fifth of the developed countries and would need to appreciate significantly during the Amrit Kaal, a period of rapid economic growth. "Estimates suggest that the minimum level of per capita final energy requirement for India to become a developed country with an HDI of 0.9 must be in the range of 45.7 to 75 gigajoules per year, when the total final consumption of energy per capita for FY23 was 16.7 gigajoules only," the draft noted.

Given the size of resources required for financing India's ambitious climate action, Union Budget 2024-25 announced that the taxonomy for Climate Finance would be developed for "enhancing the availability of capital for climate adaptation and mitigation", it said.

The framework further says that due to the complexity of the exercise and in alignment with international experience, the proposed work will be conducted in two distinct phases. "The first phase will establish the foundational framework and the approach. Following this, the second phase will involve the classification of activities, measures, and projects that are climate-supportive, along with those facilitating transition in specific sectors and industries."

This phased approach aims to enhance clarity and transparency for investors while ensuring that the taxonomy remains aligned with India's developmental goals and climate commitments. "Acknowledging that taxonomy must continually evolve in scope and depth to reflect the dynamic nature of the economy, it will be a living document that will be reviewed and updated from time to time," the draft said.

Objective of the taxonomy

Broadly, the climate finance taxonomy is a tool to identify activities consistent with India's climate action goals and transition pathway. "The objective is to facilitate greater resource flow to climate-friendly technologies and activities, enabling achievement of the country's vision to be Net Zero by 2070 while also ensuring long-term access to reliable and affordable energy," the draft said.

Specifically, the taxonomy will cover technologies, measures, projects and activities that are aligned to: (a) mitigation-which

includes improvements in energy efficiency or reduction in emission intensity, and avoidance of GHG emissions; (b) adaptation- action that enhances resilience, including sustainable water management, ecosystem protection and restoration; and (c) support transition of hard-to-abate sectors-transition activities in line with the specific pathway for hard-to-abate industries, innovation and R&D facilitate low carbon pathways.

Design of the taxonomy

The draft further explains two broad aspects to framing a taxonomy - qualitative and quantitative. Qualitative elements can define the core principles guiding green activities and align with India's NDCs and SDGs, while quantitative elements—such as GHG intensity reduction thresholds and sustainability performance metrics—can provide measurable targets for transparency and accountability.

"A hybrid approach that combines qualitative principles with quantitative metrics ensures that the taxonomy remains inclusive, addressing India's diverse industrial structure and responding to new targets, regulatory changes, and policy dynamics while promoting a science-based trajectory for climate transition," said the draft.

The classification of activities contributing towards India's climate commitments will be into two baskets - climate supportive and climate transition. Climate-supportive activities would include either of these activities: avoiding GHG emissions, reducing emission intensity, or deploying adaptation solutions that reduce the risk of adverse impacts of climate change.

Additionally, to begin with, the following sectors will be considered: power, mobility, and buildings in the context of climate mitigation and adaptation co-benefits; agriculture, food and water security will be in the context of climate adaptation and resilience building; and addressing transition, in line with country circumstances, in hard-to-abate sectors. "Iron and Steel and Cement shall be considered at the outset," the framework said.

(moneycontrol.com -07/05/2025)

INDIA'S SERVICES SECTOR GROWTH IMPROVES SLIGHTLY IN APRIL ON NEW ORDER INFLOWS

India's service sector activity grew marginally in April as compared to the previous month, according to a survey of private sector companies. The improved activity was driven by a surge in new orders, notably from the U.S., and an easing of cost pressures.

The HSBC India Services PMI Business Activity Index, calculated based on a single question of how the level of business activity compares with the situation the month before, came in at 58.7 in April, up from 58.5 in March. This, HSBC India said in its report, continued to remain higher than India's long-term average of 54.2. "The overall expansion in output was fuelled by a significant rise in new business intakes, the joint-best in eight months, with many firms noting favourable demand conditions and successful marketing efforts," the report said. "In some instances, efficiency gains reportedly enabled companies to take on more work." Orders placed with Indian companies originated in Asia, Europe, the Middle East and with the US "particularly cited as sources of strength". "New export orders gained momentum after taking a breather in March, accelerating at its fastest pace since July 2024," Pranjul Bhandari, Chief India Economist at HSBC said in the report. "Margins improved as cost pressures eased and prices charged rose at a faster pace."

Notably, the strong export demand for Indian services comes on the back of a similar trend for India's manufacturing sector in April. According to HSBC's India Manufacturing PMI, released on May 2, new business from abroad in April for the manufacturing sector grew at its second-fastest rate in over 14 years.

However, Ms Bhandari added that, while Indian services firms remained optimistic about future growth, their confidence "waned slightly".

(thehindu.com – 06/05/2025)

-: JILTA : -

***Owner**: Indian Leather Technologists' Association, **Publisher & Printer**: Mr. S. D. Set, **Published From**: 'Sanjoy Bhavan', (3rd floor), 44, Shanti Pally, Kasba, Kolkata - 700107, West Bengal, INDIA and **Printed From**: M/s TAS Associate, 11, Priya Nath Dey Lane, Kolkata- 700036, West Bengal, INDIA*

History and Activities Indian Leather Technologists' Association

The Indian Leather Technologists' Association (ILTA) was founded by Late Prof. B. M. Das, the originator of Das-Stiasnay theory and father of Indian Leather Science on 14 th August' 1950. ILTA is the Member Society of IULTCS (International Union of Leather Technologists & Chemists Societies) representing India.

The primary objectives of the oldest Leather Technologists' Association which celebrated its Diamond Jubilee year in the 2010, are:

- To bring all concerned with the broad spectrum of the leather industry under one umbrella.
- To organize seminar, symposium, workshop in order to create information, knowledge and latest development for the benefit of all concerned. To offer a common platform for all to interact with each other in order to understand each other's problems and prospects.
- To publish monthly journal as a supplement to those above objectives. The monthly journal of ILTA is known as journal of Indian Leather Technologists' Association and is the most widely circulated technical journal concerning leather technology.
- To publish text books for the benefit of students at various levels of study, for the researchers and industry.
- To have interface between urban and rural sector.
- To assist Planning Commission, various Government Institutions, Ministry and autonomous bodies to formulate appropriate policies acceptable and adoptable to the industry.
- To organize practical training and to provide skilled manpower and to motivate good students for study.
- To conduct activities related to the growth of the export of leather and leather goods from India.

ILTA also organizes Prof. B. M. Das Memorial Lecture every year during the Foundation Day Celebrations on 14 th August and Sanjoy Sen Memorial Lecture on 14 th January, the birthday of our late President for several decades. Many reputed scientists, industrialists and educationists have delivered these prestigious lectures. Foreign dignitaries during their visits to India have addressed the members of ILTA at various times.

ILTA have published the following books:

1. An Introduction to the Principles of Physical Testing of Leather by Prof. S.S. Dutta
2. Practical Aspects of Manufacture of Upper Leathers by J. M. Dey
3. An Introduction to the Principles of Leather Manufacture by Prof. S. S. Dutta
4. Analytical Chemistry of Leather Manufacture by P. K. Sarkar
5. Comprehensive Footwear Technology by Mr. Shomenath Ganguly
6. Treatise on Fatliquors and Fatliquoring of Leather by Dr. Samir Dasgupta
7. Synthetic Tanning Agents by Dr. Samir Dasgupta
8. Hand Book of Tanning by Prof. B. M. Das

ILTA presents awards in the name of Prof. B. M. Das Memorial, Sanjoy Sen Memorial and J. M. Dey Memorial Medals to the top rankers at the University graduate and post graduate levels. J. Sinha Roy Memorial Award for the author of the best contribution for the entire year published in the monthly journal of the Indian Leather Technologists' Association (JILTA). From the year 2023 ILTA has started to present a Scholarship namely Prof. Moni Banerjee Memorial Scholarship to a Student of B.Tech / M.Tech Leather Technology who is meritorious but financially crippled.

contd.

ILTA
Since 1950

Indian Leather Technologists' Association
[A Member Society of International Union of Leather Technologists' and Chemists
'Sanjoy Bhavan', 3rdFloor, 44, Shanti Pally, Kolkata- 700 107, WB, India
Phone : 91-33-2441-3429 / 3459 WhatsApp +91 94325 53949
E-mail : admin@iltaonleather.org; mailtoilta@rediffmail.com
Website : www.iltaonleather.org

Rgtn. No. KOL RMS/074/2025-27

History and Activities Indian Leather Technologists' Association

The International Congress of IULTCSused to held in different locations of the world once in two years. In its 125 years history, for the first time the Congress was held in January 1999 outside the developed countries and that too in India at CLRI, Chennai. Indian Leather Technologists' Association organized the Congress under the able leadership and guidance of Late Sanjoy Sen, the then President of ILTA and IULTCS and Dr. T. Ramasami, the then Vice-President of ILTA and Director, CLRI, Chennai. In 2017 IULTCS Congress was successfully held again at Chennai, India for the second time.

In order to promote and provide marketing facilities, to keep pace with the latest design and technology, to have better interaction with the domestic buyers, ILTA has been organizing LEXPO fairs at Kolkata from 1977, Siliguri from 1992 and Durgapur from 2010. To help the tiny, cottage and small-scale sectors industries in marketing, LEXPO fairs give the exposure for their products. Apart from Kolkata, Siliguri and Durgapur, ILTA have held LEXPO at Bhubaneswar, Gangtok, Guwahati, Jamshedpur and Ranchi. In commensurate with the time, demand and new perspective of the modern leather users, ILTA has started to organize LEXPO in Kolkata from 2022 in a new shape with the Manufacturers and Exporters of Leather Goods from all over India.

- ILTA has celebrated its Golden Jubilee with a year long programme from 14 th August' 2000 to 13 th August' 2001 along with the first conference of South East Asian Countries at Netaji Indoor Stadium, Kolkata.
- ILTA has also celebrated its Diamond Jubilee with a year long programme from 14 th August' 2010 to 13 th August' 2011 along with the 8th Asia International Conference on Leather Science and Technology (AICLST) at Hotel 'The Stadle', Kolkata.
- ILTA is going to celebrate its Platinum Jubilee with a year long programme from 14th August, 2025 to 13th August, 2026 along with the 14th Asia International Conference on Leather Science & Technology (AICLST) in Kolkata.

The Association's present (as on 31.03.2024) strength of members is around 550 from all over India and abroad. Primarily the members are leather technologists passed out from Govt. College of Engineering and Leather Technology – Kolkata, Anna University – Chennai, Harcourt Butler Technological Institute – Kanpur, B. R. Ambedkar National Institute of Technology – Jalandhar and Scientists and Research Scholars from Central Leather Research Institute (CLRI).

In order to strengthen its activities, ILTA have constructed its own six storied building at 44, Shanti Pally, Kasba, Kolkata – 700107, West Bengal, India and have named it as "Sanjoy Bhavan".

This Association is managed by an Executive Committee duly elected by the members of the Association. It is absolutely a non-profit making voluntary organization working for the betterment of the Leather Industry. None of the Executive Committee members draws any remuneration for their services rendered but they get the satisfaction of being a part of this esteemed organization.

ILTA Since 1950

Indian Leather Technologists' Association
A Member Society of International Union of Leather Technologists' and Chemists Societies (IULTCS)
'Sanjoy Bhavan', 3rdFloor, 44, Shanti Pally, Kolkata- 700 107, WB, India
Phone : 91-33-2441-3429 / 3459 ✱ WhatsApp +91 94325 53949
E-mail : admin@iltaonleather.org; mailtoilta@rediffmail.com
Website : www.iltaonleather.org