



ILTA  
Since 1950

# JILTA

Journal of Indian Leather Technologists Association

₹50.00

Vol. No. LXIX No. 02

Regd. No. ISSN 0019-5738

RNI No. 2839/57

February 2019

Special Issue



# Our Activities

- An Association with over 600 members from India and abroad working since last 68 years for the growth and development of Leather and its allied industries.
- Organize seminars, symposiums, workshops in order to share information, knowledge & latest development and interactions for the benefit of all concerned.
- Organize Human Resource Development programmes on regular basis.
- Publish for over 60 years, a technical monthly journal namely “Journal of Indian Leather Technologists’ Association” (JILTA), widely circulated through out the World.
- Publish books for the benefit of the students at various levels of study, for the Research Scholar and the Industry.
- Work as interface between Industry and the Government.
- Assist Planning Commission, various Government Institutions, Ministry and autonomous bodies to formulate appropriate policies for the growth of the Industry.
- Assist small and tiny leather goods manufacturers in marketing their products by organizing LEXPOs in Kolkata and different parts of India.

## 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 Telefax : 91-33-2441-7320  
E-mail : admin@iltaonleather.org; mailto:ilta@rediffmail.com  
Website : www.iltaonleather.org



ILTA  
Since 1950

Best wishes for IILF Chennai 2019  
striving towards Greener World



Epitome of Sustainability  
for  
Next Generation



**Indian Leather Technologists' Association**

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



ILTA  
Since 1950

ILTA





# 1st Prof. S. S. Dutta Memorial Lecture

## Indian Leather Technologists' Association

requests the pleasure of your company at  
the 1st 'Prof. S. S. Dutta Memorial Lecture' during the  
Indian International Leather Fair (IILF-2019), Chennai  
at its Seminar Hall 'A' on Saturday, the 2nd February' 2019 at 11.00 am  
(Registration from 10.30 am)



**Speakers**  
Dr. B. Chandrasekaran, *Director, CSIR - CLRI*  
1st 'Prof. S. S. Dutta Memorial Lecture' titled  
"Concepts to Practice: Journey of CSIR-CLRI through translational path"  
And  
Dr. B. Chattopadhyay, *Ex-Principal, GCELT, Kolkata &*  
*now Principal, MCKV Institute of Engg., Howrah*  
the memorabilia lecture on Prof. S. S. Dutta titled,  
"Humble contribution of Prof. S. S. Dutta towards the Students of Leather Technology"

**Chief Guest**  
Mr. N. Safeeq Ahmed, *Chairman,*  
*Indian Finished Leather Manufacturers & Exporters Association,*

**Guests of Honour**  
Padmashri & Padmabhusan Dr. T. Ramasami, *Ex-Secretary,*  
*Dept. of Science & Technology, Govt. of India;*  
Mr. Sothi Selvam, *Director, Balmer Lawrie & Co.;*  
Mr. Tuncay Deriner, *Managing Director, Stahl India (Pvt.) Ltd.;*  
Dr. Peter Amann, *CEO - TFL Group, Management, TFL Ledertechnik AG;*  
Mr. Diganta Ghosh, *Director, TFL Quinn India Pvt. Ltd.;*  
Mr. Tapan Nandy, *President, ILPA Infrastructure Development Foundation;*  
Mr. Ramesh Kumar Juneja, *Regional Chairman (East), Council for Leather Exports;*  
Mr. Imran Ahmed Khan, *General Secretary, CLCTA &*  
Mr. Tathir Zaidi, *Senior Programme Manager, Solidaridad - Asia*

**VENUE:** Chennai Trade Centre,  
Mount Poonamalle Road,  
Nandambakkam,  
Chennai (India)



**!! You are most cordially invited to participate !!**

**Arnab Jha**  
President, ILTA

**Susanta Mallick**  
General Secretary, ILTA

**N. R. Jagannathan**  
President, Southern Regional Committee  
ILTA





Programme Overleaf



ILTA  
Since 1950



# 1st Prof. S. S. Dutta Memorial Lecture

## Indian Leather Technologists' Association

### PROGRAMME

VENUE: Chennai Trade Centre,  
Mount Poonamalle Road,  
Nandambakkam,  
Chennai (India)

- 10.30 : Registration
- 11.05 : Welcome Address by **Mr. N. R. Jagannathan**
- 11.20 : Address by **Mr. Arnab Jha**, President, ILTA
- 11.25 : Address by **Mr. N. Safeeq Ahmed**, Chief Guest
- 11.30 : Address by Guests of Honour :

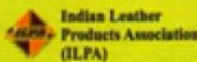
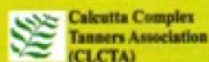
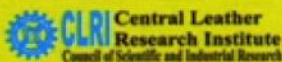
- **Dr. T. Ramasami**
- **Mr. Sothi Selvam**
- **Mr. Tuncay Deriner**
- **Dr. Peter Amann**
- **Mr. Diganta Ghosh**
- **Mr. Tapan Nandy**
- **Mr. Ramesh Kumar Juneja**
- **Mr. Imran Ahmed Khan**
- **Mr. Tathir Zaidi**

- 11.50 ■ Presentation of S. S. Dutta Memorial medals
- 11.55 ■ Release of the IILF - 2019 special issue of JILTA
- Announcement of the awards to the Best Exporters during 2017-18

- 12.00 : Memorabilia Lecture by **Dr. B. Chattopadhyay**
- 12.30 : 'Prof. S. S. Dutta Memorial Lecture' by **Dr. B. Chandrasekaran**
- 13.00 : Vote of Thanks by **Mr. Susanta Mallick**
- 13.10 : Refreshment



Co-organisers



Media Partners





#### PIDITHANE A 350

- High Solids Polyurethane binder
- Good covering property
- Excellent emboss retention

#### PIDITHANE A 201

- Soft and Micro fine polyurethane binder
- Can be used as adhesion promoter binder

#### PIDITHANE NIPU

- Non-Ionic Soft polyurethane binder
- Can be used as adhesion promoter binder
- Can be used in polishable coats along with protein binder

#### PIDITHANE A 101

- Medium Hard in nature
- Very good polishability

#### PIDITHANE 1155B

- Soft aromatic PU
- Very good adhesion promoter

Pidilite Industries Ltd.

IP Division - Ramkrishna Mandir Road, Andheri (E), Mumbai 400 059 INDIA

T: +91 22 2835 7136 • F: +91 22 2836 7165 • E: leatherchem@pidilite.com • www.pidiliteindustrialproducts.com



The advertisement features a background of leather with a wavy, scalloped edge. At the top left, the Pidilite logo is displayed above the text 'INDUSTRIAL PRODUCTS'. The main title 'ACROLINE DYE SOLUTIONS' is prominently displayed in large white letters, with the subtitle 'Metal Complex Dye Solutions for Leather Finishing' below it. Two purple rounded rectangular boxes highlight the 'P SERIES' and 'DP SERIES'. The bottom of the advertisement is a solid red banner containing contact information for Pidilite Industries Ltd.

**PIDILITE** | **INDUSTRIAL PRODUCTS**

# ACROLINE DYE SOLUTIONS

Metal Complex Dye Solutions for Leather Finishing

**P** SERIES

**DP** SERIES

**ACROLINE P SERIES**

- High concentrated dyes, originally synthesized in liquid form.
- Excellent light fastness and resistance to spotting by water droplets.
- **Free from:** Formaldehyde, Benzidine, PCP/TCP/OPP, NMP, APEO/OPEO, Phthalates, Restricted Azo Amines, Banned Solvents
- **Available shades:** Black PR, Black PS, Orange PR, Yellow PG, Red Brown PR, Rubine PB, Cherry Red PG, Yellow PR, Light Brown PG, Royal Blue PR, Dark Brown PR, Brown PB

**ACROLINE DP SERIES**

- Dyes originally synthesized in liquid form.
- Excellent Light Fastness and resistance to spotting by water droplets.
- **Free from:** Formaldehyde, Benzidine, PCP/TCP/OPP, NMP, APEO/OPEO, Phthalates, Restricted Azo Amines, Banned Solvents
- **Available shades:** Black DPR, Black DPS, Orange DPR, Yellow PG, Red Brown DPR, Rubine DPB, Yellow DPR, Cherry Red DPG, Light Brown DPG, Royal Blue DPR, Dark Brown DPR, Brown DPB,

**Pidilite Industries Ltd.**  
 IP Division - Ramkrishna Mandir Road, Andheri (E), Mumbai 400 059 INDIA  
 T: +91 22 2835 7136 • F: +91 22 2836 7165 • E: leatherchem@pidilite.com • www.pidiliteindustrialproducts.com



## JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

FEBRUARY, 2019

VOL.: LXIX

NO.: 02

RNI NO.: 2839/57

REGD.NO.: ISSN 0019-5738

### Contents

|   |         |
|---|---------|
| Message for IILF' 2019.....   | 03 - 04 |
| 1st S. S. Dutta Memorial Lecture.....   | 05 - 06 |
| Pidilite Corner.....  | 07 - 08 |
| Portfolio.....  | 09 - 12 |
| Editorial.....  | 13 - 15 |
| Gallery.....  | 17 - 20 |
| ILTA News.....  | 21 - 23 |
| Article-'An Approach to Reduce the Possibilities of Chromium (VI) Formation in Leather with Balsyn® SAR by Mr. M. C. Bose, Mr. J. K. Basu, Mr. J. Chaudhuri.....  | 24 - 26 |
| Balmer Lawrie Corner.....   | 27 - 30 |
| Article - 'Impact of the Leather Industry on human and Environmental Health' by Dibyendu Bikash Datta.....  | 31 - 44 |
| STAHL Corner.....   | 45 - 48 |
| Article - 'Nitrogen disposal through solid waste and liquid waste generated from the Leather Industry - A case study in Calcutta Leather Complex' by Sudin Pal <sup>1</sup> , Sanjoy Chakraborty <sup>1</sup> , Buddhadeb Chattopadhyay <sup>2</sup> & Subhra Kumar Mukhopadhyay <sup>1</sup> ..... | 49 - 53 |
| Solidaridad News.....   | 54 - 55 |
| News Corner.....  | 56 - 60 |
| ILPA Corner.....  | 61 - 62 |
| Article - '3D Printing cum Laser cutting and Engraving in Footwear Industry' by <sup>1</sup> Arjun Verma, <sup>2</sup> Devendra Kumar Chaturvedi, <sup>3</sup> Hardik Chadda.....   | 63 - 66 |
| Student Corner.....   | 69 - 70 |
| TFL Corner.....   | 71 - 72 |
| Down Memory Lane.....   | 73 - 76 |
| Scenario of the growth rate & statistics of present Indian economy : significantly driven by it's foreign trade policy by Bibhas Ch. Paul.....  | 77 - 81 |
| Economic Corner.....  | 82 - 87 |

**Hony. Editor :** Dr. Goutam Mukherjee

**Communications to Editor through E-mail :**

jiltaeditor@gmail.com; admin@iltaonleather.org

**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 : 91-33-2441-3429/3459

Telefax : 91-33-2441-7320

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

Web site : [www.iltaonleather.org](http://www.iltaonleather.org)

**Opinions expressed by the authors of contributions published in the Journal are not necessarily those of the Association**

## 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.

### Advertisement Tariff

#### Full Page / per month

|   |                 |
|---|-----------------|
| Black & White   | Rs. 5,000.00/-  |
| Colour (full page)  | Rs. 10,000.00/- |
| Colour Insert (One side)<br>(Provided by the Advertisers) | Rs. 5,000.00/-  |

#### Full Page / per anum

|                                      |                |
|--------------------------------------|----------------|
| Front inside (2 <sup>nd</sup> Cover) | Rs. 96,000/-   |
| 3 <sup>rd</sup> 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 : 91-33-24413429/3459, Telefax : 91-33-24417320  
E-mail : [admin@iltaonleather.org](mailto:admin@iltaonleather.org) / [mailtoilta@rediffmail.com](mailto:mailtoilta@rediffmail.com)  
Website : [www.iltaonleather.org](http://www.iltaonleather.org)

## INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION

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

### Executive Committee (2017-19)

#### Central Committee

President : Mr. Arnab Kumar Jha

Vice-Presidents : Mr. Asit Baran Kanungo  
Dr. K. J. Sreeram  
Mr. P. K. Bhattacharjee

General Secretary : Mr. Susanta Mallick

Joint Secretaries : Mr. Shiladitya Deb Choudhury  
Mr. Bibhas Chandra Jana

Treasurer : Mr. Kaushik Bhuiyan

Committee Members :

Mr. Jiban Dasgupta  
Mr. Kanak Kr. Mitra  
Mr. Pradipta Konar  
Mr. Alokesh Roy  
Mr. Aniruddha De  
Mr. Alope Kumar De  
Mr. Subir Dutta  
Mr. Deepak Kr. Sharma  
(Secretary of Northern Region)  
Dr. R. Mohan  
(Secretary of Southern Region)

Ex-Officio Member : Dr. Goutam Mukherjee

#### Regional Committees

##### Southern Region :

President : Mr. N. R. Jaganathan

Vice-President : Dr. J. Raghava Rao

Secretary : Dr. R. Mohan

Treasurer : Dr. Swarna V Kanth

##### Committee Members :

Dr. J. Kanagaraj  
Dr. Subhendu Chakraborty  
Dr. S. V. Srinivasan  
Mr. S. Siddharthan  
Mr. P. Thanikaivelan

##### Northern / Western Region :

President : Mr. Jai Prakash Saraswat

Vice-President : Mr. Kamal Sharma

Secretary : Mr. Deepak Kr. Sharma

Treasurer : Mr. Jaswinder Singh Saini

##### Committee Members:

Mr. Rajvir Verma  
Mr. Sudagar Lal  
Mrs. Sunita Devi Parmer  
Mr. Rajeev Mehta  
Mr. Sunil Kumar

JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

EDITORIAL BOARD OF JILTA

|                                   |   |  |
|-----------------------------------|---|--|
| <b>Chief Patron</b>               | : | Dr. T. Ramasami  |
| <b>Advisers</b>                   | : | Prof. Dr. A. B. Mandal<br>Mrs. Antara Kumar<br>Dr. Bi Shi<br>Dr. B. N. Das<br>Dr. Buddhadeb Chattopadhyay<br>Dr. Campbell Page<br>Dr. Carlo Milone<br>Dr. Chandan Rajkhowa<br>Mr. E. Devender<br>Dr. Pisi<br>Dr. Roberto Vago<br>Dr. Samir Dasgupta<br>Prof. Swapan Kumar Basu<br>Mr. Suparno Moitra<br>Dr. Subha Ganguly<br>Dr. Tim Amos<br>Dr. Tapas Gupta |
| <b>Peer Reviewing Committee :</b> |   | Prof. A. K. Mishra<br>Mr Abhijit Dutta<br>Mr. Animesh Chatterjee<br>Dr. B. Chandrasekharan<br>Mr. Diganta Ghosh<br>Dr. J. Raghava Rao<br>Mr. Jayanta Chaudhuri<br>Dr. N. K. Chandrababu<br>Mr. Prasanta Kumar Bhattacharyya<br>Dr. Subhendu Chakrabarti<br>Mr. Satya Narayan Maitra  |
| <b>Hony Editor</b>                | : | Dr. Goutam Mukherjee   |
| <b>Joint Editors</b>              | : | Dr. Sanjoy Chakraborty<br>Dr. Anjan Biswas   |



# Robotics - How It Does Boost !!!



Industrial robots are on the verge of revolutionizing manufacturing sectors. As they become smarter, faster and cheaper, they get being called upon to do more—well beyond traditional repetitive, onerous or even dangerous tasks such as welding and handling of materials. They are taking on more “human” capabilities and traits such as sensing, dexterity, memory, trainability, and object recognition. As a result, they are taking on more jobs—such as picking and packaging, testing or inspecting products, or assembling minute electronics. In addition, a new generation of “collaborative” robots ushers in an era shepherding robots out of their cages and literally hand-in-hand with human workers who train them through physical demonstration.

Europe is the global leader in the footwear industry for high value added shoes, with production centred on Italy and Spain.□ Fashion dictates that the footwear industry has some of the shortest production runs in almost any industry, so any automation would have to be extremely flexible in order to cope with small production batches. The modern robots (ROBOFOOT) recognizes that it will have to modify current production layouts and facilities in order to introduce advanced flexibility. Within the robot cell, an intelligent vision system will scan the scene and work in conjunction with a force sensor to recognize the objects within the cell and identify the components, such as the lasts, the various shoe parts and the packaging. The robot will then be able to use its sensors to locate the best positions to manipulate the shoe components and grasp the final packaging.

As costs of advanced robotics continue to fall (from several hundreds of thousands of dollars now to tens of thousands) and applications widen, industries beyond automotive – such as food and beverage – are adding them to their ranks. One major robotics company refers to its new-generation robot as an “intelligent industrial work assistant.” Presently, there are estimated 1.5 million robots toiling away globally, with about 230,000 in the US alone.

Robots have also caught the eyes of investors, such as recent high-profile pure-play robotics investments by Google and

Amazon. According to PwC’s Money Tree survey, US venture capital investment in robotics technology has surged in the last couple of years. This maturing “R generation” holds myriad implications for the future of manufacturing. Wider adoption of robots comes at a time when manufacturers—both big and small—are under increasing pressures to squeeze even greater productivity from their workforces and when wage arbitrage seems less attractive in some locales, such as China, as it was a decade ago for US manufacturers. Broader adoption of robots may even help to spur greater re-shoring of manufacturing from overseas back to the US—or closer to the US market, such as in Mexico. And, for small and medium-sized companies, a question is arising sooner than most probably expected: “Is now the time to hire some automated help?” That question isn’t being prompted only as a result of increased affordability. The nascent age of “nearly human” robots is driving greater efficiencies, and holds promise to reduce injuries of labour force and drastic reduction of occupational health hazards.

Manufacturers are also finding that being competitive means injecting greater flexibility into their production in order to satisfy consumer demand for products with shorter life cycles and a greater variety of products or variants of existing products, and are tapping robots to help on this front as well. All this opens new options, choices and paths for manufacturers.

But question which go on murmuring are whether robots can take on labor in ways that frees up and makes better use of human resources and unleashes innovation? Are there ways robots can be applied in applications that a current workforce is unable to carry out (such as those of high precision or force) which will open new opportunities of faster and greater production of existing products or, perhaps more important, enable altogether new product development? Are robots an economically viable and realistic solution to the increasing difficulty of securing a sustainable manufacturing workforce? If robots displace employees, are there plans in place to move those employees to other tasks—preferably more interesting and attractive to them and more valuable to the company?

We have found that while the majority of respondents have already adopted robotics technology, there still exists real barriers for those which have yet to do so, citing limitations such as cost, the lack of perceived need, and expertise and skills needed to properly exploit them. Now the ethical question surpasses the technological advances whether robots are job makers or job takers !!

Robots are being brought on lines to do work that's undesirable or dangerous, or that they can perform better (with greater precision, strength or stamina) than humans. But could a greater robotic work force actually drive a need for more human talent to train, repair and minister to that growing robotic workforce? Not to mention the talent needed to develop the burgeoning robotic technology industry itself ?

According to a PwC survey of US manufacturers, over one-third of manufacturers said that the biggest impact robots will have on the manufacturing workforce in the next three years is that they will lead to "new job opportunities to engineer advanced robots and robotic operating systems." And about one in four felt the biggest impact would be "more demand for talent to manage the robotic workplace."

Equally important is that 27% of manufacturers said the biggest impact would be "replacement of workers." "The conventional thinking is that companies are buying robots to replace people. It is not that simple. In many cases, companies are using robots so they can expand and improve product quality and increase production. They end up hiring more people such as engineers or sales staff to support that growth," said Greg Selke, CEO of ONEXia, Inc., a Philadelphia-based provider of automation hardware and software to manufacturers. "One of our clients is an electronics company that needed a robot to apply epoxy on very small parts— the robot justified that functionality as the task would be very difficult for a human to accomplish. It had nothing to do with firing people," added Selke.

Consider electric auto-maker Tesla, now the largest auto-industry employer in California (employing more than 6,000 with plans to add another 500 by the end of 2014) but also renowned for its cutting-edge automation. The company deploys at least 160 robots to help produce its Model S— chipping in to install batteries, cabling components and to bend

and form aluminum. The company is targeting production of 500,000 vehicles a year by 2020 and is mulling opening a factory (to mass produce car batteries) which would employ an additional 6,500 workers. While in Tesla's case, automation has helped fuel overall growth which has, in turn, been followed by additional hiring, other companies could well find that the adding of robotics (and subsequent growth through automation) does not necessarily lead to increased hiring. Indeed, the effects of robotics on workforces are many and varied.

Deploying robotics is not only a functional or operational issue for companies and their employees. It can also be an emotional one. How best to keep morale up among human workers and to nurture professional mobility and avoid consternation amongst a workforce looking over its shoulder in fear of losing jobs to new robotic hires? Consider a recent Harvard study which explored German, British and Chinese workers' response to different conditions surrounding being replaced by a robot. It concluded that workers were more concerned over being botsourced (displaced by a robot) when their jobs are described as requiring more emotion than cognition. It also found that workers of different nationalities tend to define cognitive-oriented and emotion-oriented jobs differently.

There is also speculation that robots could actually stimulate employment of humans—through not only their manufacturing, but also the talent needed to program, train, maintain and repair them. According to one study, global "robot-driven" job creation could reach 1.5 million through 2016. However, it is important to note that while new robotics-related job growth is likely, it is also likely that robot-linked job losses will also accompany that growth and that the net jobs growth as a product of robotics technologies will likely differ from company to company and sector to sector.

As companies continue to embrace robotics and other types of automation and grow more data-driven, their success will largely hinge on shaping and building a workforce that can best exploit such technological advancements. To do that, manufacturers are feeling a growing need to pull from a wider—and deeper— pool of talent. According to a PwC analysis based on U.S. Bureau of Labor Statistics, the most robotics-intensive manufacturing sectors in the US as a proportion of the total work force—i.e.,



automotive, electronics and metals—employ about 20% more mechanical and industrial engineers than do less robotics-intensive manufacturing sectors. They also happen to pay higher wages than other manufacturing sectors. These industries also employ a higher proportion (nearly twice) of installation maintenance and repair workers, than do other manufacturing sectors, partially due to their need to program, operate and service robots. Interestingly, these sectors also tend to have a higher proportion of production-line workers—and these workers earn higher wages than sectors that are less robotics - intensive. However, engineers at the most robotics-intensive manufacturing sectors earn slightly less than engineers employed by the overall manufacturing industry.

As manufacturers adopt a new generation of robots designed not only to be safe around humans but also to actually work collaboratively with humans, a new relationship will emerge between man and machine, with robots as bona fide co-workers and assistants—not just high-tech tools sequestered behind glass.

The entry of the collaborative robot (or so-called “co-bot”) on the factory floors, assembly lines and distribution centers is already underway. Plug-and-play robots, such as the newest generations of Universal’s UR5 and UR10 are designed to work next to people in warehouses and small businesses, doing tasks such as sorting packages, operating CNC machines or applying glue in an automotive factory. They’re designed to be safe around people; they can slow their speed when a human enters their work space, then speed up after the human leaves.

Rethink Robotics’ Baxter, a humanoid-looking robot with a torso, two arms and even a screen with a face that shows facial expressions (e.g., of concentration, confusion or satisfaction) lets factory workers guide its arm through a task and program the activity through physical example, rather through programming. It can learn—through relatively fast physical demonstration—simple, repetitive tasks like picking up parts off a conveyor or packing and unpacking boxes. This saves time and costs on complex set-ups which can take weeks or even months, depending on the task, with traditional industrial robots. Ease of trainability of the next generation of robots will likely be useful especially for small and medium-sized

enterprises which need to toggle between different products and produce in small batches.

The newer generation of co-bots is also lowering the barrier to entry for smaller companies with limited capital and expertise to program, calibrate and set-up traditional industrial robots. “What we’re really talking about for the end-goal is for the human and the robot to move a heavy part together in a safe way,” said Dr. S.K. Gupta, Professor, Department of Mechanical Engineering and Institute for Systems Research, University of Maryland, in an interview with PwC. “We are really close—I think within two years—from getting robots to genuinely and commonly take part in physical collaboration... Not just the dirty dangerous or hard tasks in structured environments, but say, for example, mix batch injection molding where a specific part is removed, cleaned, inspected and placed into a container,” Gupta added. Getting humans and robots to work more closely will likely come about as robotics developers continue to incorporate human characteristics in robotics systems. University of British Columbia researchers, for example, programmed a robot that uses human-like non-verbal communication cues and body language (e.g., head, neck and eye movements) to improve communication with humans. They found that movements such as eye gaze as a cue made a robot’s handing over of a water bottle to a human more fluid.

Robots are good at precision, for example to polish a part. But even polishing can require human touch or human perception. So, there are ways in which it makes sense for robots and humans to work on the same application, added Gupta, with each taking on sub-routines of a multiple-task job. There are many instances in the final steps of assembly of a product that could require precise alignment, for example, bringing a part into place which takes a lot of dexterity and precision. You could break a large task into sub-tasks that bring into play human-robot collaboration. In these ways, instead of two humans working together, you could have one human and one or two robots working in a hybrid approach.

*Goutam Mukherjee*

**Dr. Goutam Mukherjee**  
Hony. Editor, JILTA

**GSP**

Mob. 98301 06826

**Tapan Kumar Ghosh**  
Govt. Contractor & Order Suppliers

**GHOSH STEEL FURNITURE**  
SSI Unit for Steel & Wooden Furniture



**3A, Gagan Sarkar Road, Kolkata - 700 010**



## 68th Foundation Day Celebration





ILTA  
Since 1950

## 60th Annual General Meeting

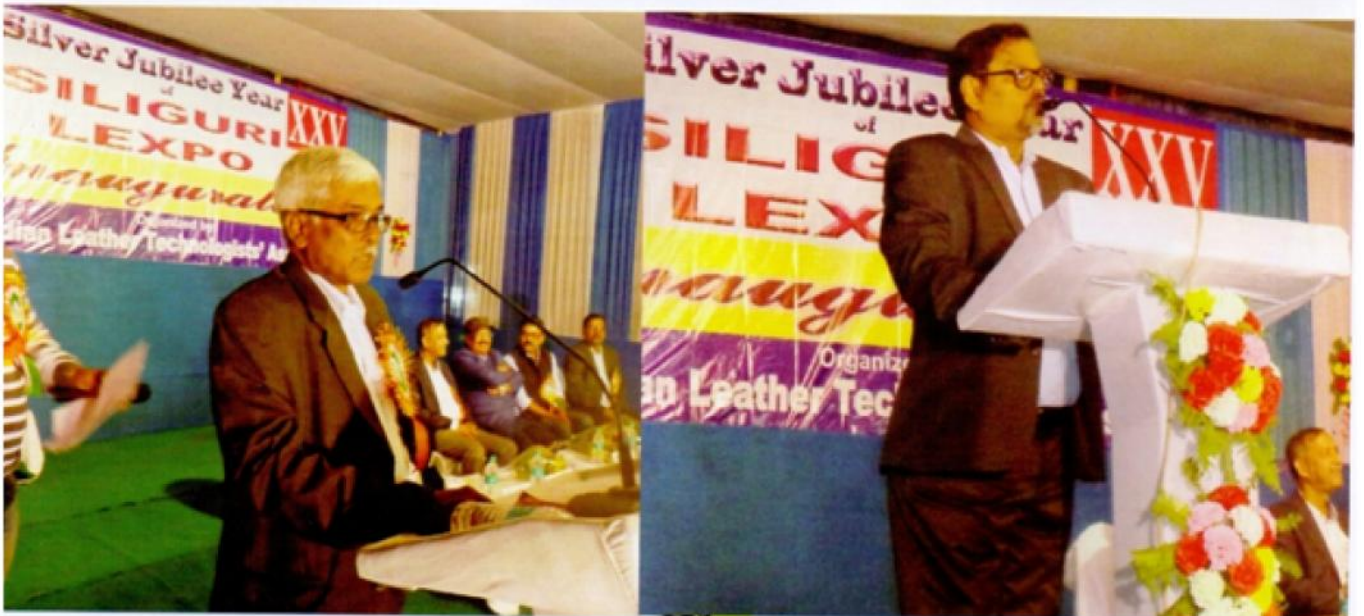


## 17th Sanjoy Sen Memorial Lecture





### Siliguri LEXPO XXV



## From the desk of General Secretary



### 17<sup>th</sup> Sanjoy Sen Memorial Lecture

Above was organized at Freya Design Studio, ILPA Leather Goods Park, Calcutta Leather Complex at 11.30 Hrs. on Monday the 14<sup>th</sup> January, 2019.

The programme commenced with garlanding portrait of Late Sanjoy Sen by the following :-

1. Mr. Arnab Jha, President, ILTA.
2. Prof. Asok Kumar Banerjee, President, Calcutta Management Association, the Chief Guest.
3. Mr. Ramesh Kumar Juneja, Regional Chairman (East), CLE, Guest of Honour.
4. Mr. Imran Ahmed Khan, General Secretary, CLC Tanners Association, Guest of Honour.
5. Mr. Adhar Sahni, President, Indian Leather Products Association, Guest of Honour.
6. Mr. Tapan Nandi, President, ILPA Leather Goods Park.
7. Mr. Arjun Kulkarni, Vice President, Indian Leather Products Association.
8. Mr. Alok Kumar Basu, Ex-Editor, JILTA.
9. Mr. B. C. Jana, Joint Secretary, ILTA.
10. Dr. Goutam Mukherjee, representative of GCELT.
11. Mr. Kanak Kumar Mitra, representative of Alumni Association of GCELT.
12. Ms. Sudipa Chatterjee, representative of CFTC, Budge Budge.
13. Mr. Binoy Singh, representative of CLCTA.
14. Mr. Anirban Bhattacharjee, GM (Admin), Calcutta Management Association.

Above was followed by Welcome Address of Mr. Arnab Jha who briefly recalled various contributions of Late Sanjoy Sen to the Industry and recapitulated on various posts held by Late Sanjoy Sen as President or Chairman of various organizations / institutions.

The dignitaries present as Chief Guest and Guests of Honour were then greeted each with a bouquet and a memento as follows :-

1. Prof. Asok Kumar Banerjee by Mr. Arnab Jha, President, ILTA
2. Mr. Ramesh Kumar Juneja by Mr. Asit Baran Kanungo, Vice President, ILTA
3. Mr. Imran Ahmed Khan by Dr. Goutam Mukherjee, Editor, JILTA
4. Mr. Adhar Sahni by Mr. Shiladitya Debchoudhury, Joint Secretary, ILTA
5. Mr. Tapan Nandi by Mr. B. C. Jana, Joint Secretary, ILTA
6. Mr. Arjun Kulkarni by Mr. Kaushik Bhuiyan, Hony. Treasurer, ILTA

The names of the recipients of Sanjoy Sen Memorial Medals were then announced :-

Miss Bushra Qamar, topper in B. Tech Leather Technology Examination of HBTI, Kanpur in 2018 who received the award from Prof. Asok Kumar Banerjee. The other recipient of Sanjoy Sen Memorial Lecture was Miss Akanksha Kumari who was topper in B. Tech Leather Technology Examination of Muzaffarpur Institute of Technology, Muzaffarpur in 2018. This information was made available too late for the topper to make a suitable travel plan. Her certificate and medal will be forwarded by speedpost.

On behalf of the Govt. College of Engineering & Leather Technology, Dr. Goutam Mukherjee, Associate Professor announced the following awards :-

Gold Medal to composite topper of 4 years in Leather Technology, 2017 to Mr. Saurabh Sarkar whose mother received the award from Mr. Susanta Mallick, General Secretary, ILTA.

Dr. P. K. Basu Memorial Scholarships were awarded to the following :-

- a) Miss Juin Sarkar who received the award from Mr. Arnab Jha.
- b) Mr. Kundan Mukherjee who received the award from Mr. Imran Ahmed Khan.

- c) Mr. Dipayan Adhikari whose father received the award from Mr. Ramesh Kumar Juneja.
- d) Another recipient of the scholarship was Mr. Arpan Sarkar who was absent.

What followed was addressing the gathering by Mr. Ramesh Kumar Juneja, Mr. Imran Ahmed Khan and Mr. Adhar Sahni respectively.

Mr. Juneja recalled many contributions of Late Sanjoy Sen to Industry and spoke in respect of increasing investments of the Govt. of West Bengal in CLC. He also spoke about 2<sup>nd</sup> CETP which was likely to be operative in 1.5 to 2 years.

Mr. Imran Ahmed Khan spoke about his legal battle in the court for 8 long years to get IT sector to be located outside CLC area. He informed several issues with respect to Kolkata Leather Complex for better future of leather industry in West Bengal, some of them are – 5, 6, 7, 8 Modules of CETP, ETS Re-designing, Footwear Park etc.

Mr. Adhar Sahni in his address had a message to the students.

Mr. Arnab Jha then introduced Prof. Asok Kumar Banerjee to the gathering and requested him to deliver the 17<sup>th</sup> Sanjoy Sen Memorial Lecture titled **“Management Challenges in today’s turbulent Economy : Case Study approach in Indian Leather and allied Industries”**.

The lecture which was most thought provoking and was of immense interest to the younger generation attending the lecture lasted for over one hour.

Mr. Susanta Mallick, General Secretary, ILTA then commenced offering Vote of Thanks by first stating that Late Sanjoy Sen was our President for over three and a half decades in succession with his immense contribution to the Industry and our Association before passing away on 31<sup>st</sup> August, 2001. Mr. Mallick stated that from 2003 we have been organizing Sanjoy Sen Memorial Lecture on his birthday 14<sup>th</sup> January. That way today’s lecture has been the 17<sup>th</sup> Sanjoy Sen Memorial Lecture where we felicitate the toppers of B.Tech Leather Technology Exam of HBTI, Kanpur & MIT, Muzaffarpur.

He expressed his heartiest thanks to the dignitaries, guests and members present and his appreciation of the achievements of the Award Winners and wished a bright future for them.

Mr. Mallick then briefed the gathering in respect of the forthcoming seminar at Chennai during IILF-2019 stating that the seminar which we have been organizing since 2014 will henceforth be termed as “Prof. S. S. Dutta Memorial Lecture”. He gave details in respect of various dignitaries who have consented to be present on 2<sup>nd</sup> February, 2019 and extended a most cordial invitation to all to attend the seminar.

Wishing a Happy, Prosperous and Peaceful 2019 to all, Mr. Mallick requested all to join for the working lunch.

### 8<sup>th</sup> MONI BANERJEE MEMORIAL LECTURE

This will be held on Friday the 15<sup>th</sup> March, 2019 at Freya Design Studio, ILPA Leather Goods Park, Calcutta Leather Complex, Bantala. Other details in respect of the programme will be communicated in due course vide individual invitation cards.

Members wishing to avail transport (which may be arranged by ILTA) from Parama Police Station opposite Science City for to & fro journey to Bantala are requested to advise ILTA office Tel. No. (033) 2441 3429 / 2441 3459 latest by 7<sup>th</sup> March, 2019.

### Health Camp

A health camp is proposed to be jointly organized by ILTA, Indian Medical Association and R. N. Tagore Hospital at ILTA office in end February/Middle March 2019 where the following tests will be carried out at no cost to the Members :

Blood Group, ECG, Random Blood Sugar, Blood Pressure, Hemoglobin, Cardiac Consultation, Chest Test besides recording height & weight.

Time of the camp will be from 11.00 Hrs to 14.30 Hrs.

If you are interested, kindly inform ILTA office Tel. No. (033) 2441 3429 / 2441 3459 latest by 20<sup>th</sup> February, 2019 with your name and date of birth.

The next step proposed is “Health Talk” consisting of Audio-Visuals and physio therapy demonstration.

**You are requested to :-**

- a) Kindly inform us your '**E-Mail ID**', '**Mobile No**', '**Land Line No**', through E-Mail ID : [admin@iltaonleather.org](mailto:admin@iltaonleather.org) or over Telephone Nos. : 24413429 / 3459 / 7320. 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.



**(Susanta Mallick)**  
General Secretary



**Executive Committee Members meet every Thursday  
at 18-30 hrs. at ILTA Office.**

**Members willing to participate are most welcome.**

# An Approach to Reduce the Possibilities of Chromium (VI) Formation in Leather with Balsyn® SAR

Mr. M. C. Bose, Mr. J. K. Basu, Mr. J. Chaudhuri,  
Balmer Lawrie & Co. Ltd., SBU : Leather Chemicals, Chennai

## Abstract

The main hazards related to chrome tanning is an oxidation of free Cr(III) to Cr(VI) in leather. This hexavalent Chromium is well known toxic material to humans, animals and environment. Here Balmer Lawrie followed a strategy to improve chrome fixation or to reduce the presence of free/unfixed chrome Cr(III) in leather in order to reduce chrome discharge during leather processing and also to avoid/reduce the possibilities of Cr(VI) formation in leather through its product Balsyn® SAR.

## Introduction

Basic Chromium Sulphate is the most popular tanning agent in global leather production and 90% of hides and skins are being tanned with this tanning material. This tanning involves environmental risks from the possible oxidation of Cr(III) to



Cr(VI) and this hexavalent chromium is known to be toxic to animals and humans. More over the residual chrome in chrome tanning and re-chroming waste water is the main origin of chrome in effluent. A considerable amount of chrome is also released from leather in almost all the post tanning processes such as washing, neutralization, retanning with various retanning agents, dyeing, fatliquoring, and acid fixation. As a result more than 60 % of chrome added is discharged into waste water. This fact demonstrates that the chrome that

effectively reacts with collagen and produce tanning action have not been released during these processes. Hence different products and process emerged to control chrome load in the effluent and also to avoid the formation of chromium (VI) from released Cr(III).

This paper deals with the direct and indirect source of Cr(VI) in leather and the role of Balsyn® SAR to reduce the possibilities of Cr(VI) formation in leather as well as to reduce the chrome load in the environment through chrome fixation.

## Source of Cr(VI) formation in leather making



It is a fact that Cr(III) can be oxidized under certain conditions to a hazardous hexavalent form of Cr(VI). The formation of Cr(VI) is through direct sources and indirect sources such as auxiliaries, chemicals, process parameters and storage condition due to the presence of oxidizing agents in specialty chemicals used for leather making. Hence a need for scientific assessment is emerged to exclude this oxidation during normal condition of use.

\*Corresponding author E-mail : [chaudhuri.j@balmerlawrie.com](mailto:chaudhuri.j@balmerlawrie.com)





The presence of unreduced chromium in the Basic Chromium Sulphate, metal complex dyes and inorganic pigments based on lead chromate are the direct source of Cr(VI) formation in leather.

### Neutralization

At higher pH during wet blue leather neutralization with sodium bi carbonate, ammonia and cationic auxiliaries may promote the oxidation of Cr(III). It has been reported that leather samples treated with above chemicals shows the presence of Cr(VI) in extreme condition at 80p C for 24 hrs. There is no direct correlation between the final pH and Cr(VI) conversion was reported.

### Heating/Sunlight drying/Photo ageing



Thermal ageing or exposure to UV light can induce the formation of large amounts of Cr(VI). It is also reported that the natural light or UV light produced by lamp of 366 nm can induce the formation of Cr(VI).

### Fatliquoring and Bleaching Agent



Presence of free radicals present in the single or multiple unsaturated fatty acid in fatliquor products based on natural oil is released in the presence of UV light can significantly cause the formation of Cr(VI).

During ageing, the double bonds in fatliquor base are prone to be attacked by oxygen. Auto oxidation leads to formation of radicals and hydro peroxides. Peroxides formed are likely to react with the trivalent chromium and converting into hexavalent during ageing. Bleaching agents are also source for free radicals.

From all the above said sources it was understood that the formation of Cr(VI) is due to the presence of free/extractable/leachable/unfixed/ soluble Cr (III) in the leather. Experiment was done to show the presence of Balsyn® SAR in re-chroming to aid in chrome fixation and thus helps in reduce the possibilities of Cr(VI) formation in leather.

### Process adopted for experimental trials

Rechroming was done for wet blue goat leather having thickness of 1.0/1.1 mm with the following recipe

Table :1

| Process                                     | % Chemicals | Duration | Remarks      |
|---|-------------|----------|--------------|
| <b>Acid Wash</b>                            |             |          |              |
| Water                                       | 100         |          |              |
| Formic acid                                 | 0.5         | 30'      | pH 3.0 Drain |
| <b>Rechroming</b>                           |             |          |              |
| Water                                       | 100         |          |              |
| <b>Control :</b>                            |             |          |              |
| Chrome Syntan                               | 10          |          |              |
| (10 – 12 % Cr <sub>2</sub> O <sub>3</sub> ) |             |          |              |
| &   |             |          |              |
| Balsyn® SAR                                 | 0           | 45'      |              |



| Process  | % Chemicals | Duration         | Remarks            |
|--|-------------|------------------|--------------------|
| <b>Experiment :</b>  |             |                  |                    |
| Chrome Syntan<br>(10 – 12 % Cr <sub>2</sub> O <sub>3</sub> ) | 10          |                  |                    |
| Balsyn® SAR  | 2           | 45'              |                    |
| Sodium formate   | 1           |                  |                    |
| Sodium bi carbonate  | 1           | 2 X 10' +<br>40' | Check pH 4.0 D/W/D |

Experiment : With 2% Balsyn® SAR

Control : Without Balsyn® SAR

Control and experimental leathers were tested for extractable chromium content by ISO 17071-1 and can be seen from the below table that the free chrome or incomplete chrome absorption in leather was reduced from 192.2 ppm to 34.7 ppm with the aid of Balsyn® SAR.

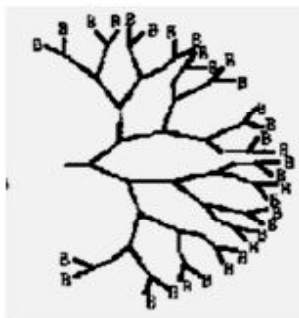
Table : 2

| Sample                              | Extractable Cr Content |
|-------------------------------------|------------------------|
| Control<br>(Without Balsyn SAR)     | 192.2 ppm              |
| Experiment<br>(With Balsyn SAR 2 %) | 34.7 ppm               |

### Nature of polymer used :

We have used BALSYN SAR, an in-house synthesized acrylic copolymer with more branching of carboxyl groups. The molecular weight, nature of carboxyl branching makes it more approachable for complexation with chromium.

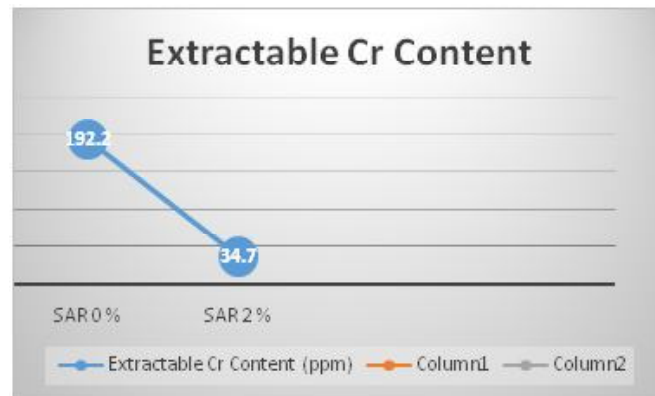
### Illustration of more branching



A copolymer with multiple carboxyl functionalities was prepared by solution technique radical polymerization of vinyl monomers

with carboxyl groups and a brancher. This polycarboxylate based polymer with multiple carboxyl ends binds more chromium to leather leading to less extractable chromium as stated in Table -2.

### Influence of Balsyn® SAR in Chrome fixation



### Conclusion:

The above results shows the presence of poly carboxyl group in Balsyn® SAR forms a complex with free or unbound chrome and aids in chrome fixation, thus helps in the reduction of free chrome (Table.2) by 82 % in re-chroming. However the percentage of free chrome will vary with wet blue leather based on process method and the material used.

Different experiments are in progress to find out the application of Balsyn® SAR in chrome tanning , neutralization, washing and in post tanning in the reduction of chrome load and also in chrome fixation to reduce the possibilities of chrome(VI) formation in leather.

### References :

1. Application of advanced polymeric compounds for development of leather production, material science engineering 111, 2016,
2. Release of chrome in chrome tanning and post tanning processes JSLTC July 2012,
3. Possibilities of hexavalent chromium generation and plausible preventive and corrective measures-CLRI,
4. Prevention of carcinogenic Cr(VI) formation in leather, Indian journal of chemical technology Jan 2014,
5. Chromium(VI)-www.leather dictionary.com,
6. chromium and leather research IULTCS Aug 2013,
7. Determination of extractable chromium from leather-research gate, Jan 2009



बामर लॉरी एण्ड कं. लिमिटेड  
(भारत सरकार का एक उद्यम)  
**Balmer Lawrie & Co. Ltd.**  
(A Government of India Enterprise)



ILTA  
Since 1950

---

# Balmer Lawrie Corner

---



बामर लॉरी एण्ड कं. लिमिटेड  
(भारत सरकार का एक उद्यम)  
**Balmer Lawrie & Co. Ltd.**  
(A Government of India Enterprise)



बामर लॉरी एण्ड कं. लिमिटेड  
(भारत सरकार का एक उद्यम)  
**Balmer Lawrie & Co. Ltd.**  
(A Government of India Enterprise)



ILTA  
Since 1950

---

# Balmer Lawrie Corner

---



बामर लॉरी एण्ड कं. लिमिटेड  
(भारत सरकार का एक उद्यम)  
**Balmer Lawrie & Co. Ltd.**  
(A Government of India Enterprise)

# Impact of the Leather Industry on Human and Environmental Health

**Dibyendu Bikash Datta, Associate Professor,**  
NATIONAL INSTITUTE OF FASHION TECHNOLOGY  
SALT LAKE CITY, KOLKATA - 700098, INDIA



## Abstract

The leather industry and its associated sectors contribute significantly to the Indian economy. The increasing size of the population, the increasing material per capita demand, and the material and energy inefficiency of industrial activities are affecting our human and environmental health at an alarming rate. Many environmental problems are associated with the leather industry. Waste discharge from tanneries pollutes the air, soil, and water, causing serious health problems. It is known that all the stages of leather processing, individually and collectively impact negatively on the environment. The paper describes and analyses the leather tanning industry in India. It focuses on explanations of the lack of conformity between the relatively strict environmental regulations and the high effluents from the tanning industry. The most important reasons for lack of firms' compliance with the environmental regulations are that the enforcement of the regulations is poor and fraudulent.

**Keywords:** Leather industry, pollutants, effluents, tannery, environment

## Introduction

Though we may consider ourselves intellectually and technologically superior to our cave-dwelling ancestors, we still adorn our bodies, transports, and homes with the skin of conquered animals. However, unlike the wholly organic methods used by our forebears, the modern leather industry is simultaneously killing the local environment and the people that work there with a toxic slurry of chemicals.

The current worldwide market for leather is booming. Around 23 billion square feet of leather are produced annually in a total market worth \$77 billion (US), according to recent estimates published in the Scribes Guild Journal.

The world's top leather producers include China and India with 6.6 billion square feet and 2 billion square feet, respectively. Other developing nations such as Bangladesh, Ethiopia, Cambodia, and Vietnam are becoming increasingly involved in the leather trade due to their lack of stringent labour, environmental safety, and manufacturing regulations (Gupta, et.al. 2018).

Leather footwear is by far the largest outlet for the stuff, valued at \$47 billion; over 60% of the world total trade while the next largest outlet, leather goods, and products (including gloves) were worth about \$12.3 billion and constituted 15.9 % of the total world trade. Leather clothing, auto upholstery, home furnishings, and miscellaneous other uses rounded out the remaining outlets with between 8 and 14% shares.

The type of leather produced in a given region depends largely on the dominant source available. Exotic leathers are also becoming more common. The Indian leather industry accounts for around 12.93% of the world's leather production of hides. India's leather industry has grown drastically, transforming from a mere raw material supplier to a value-added product exporter. Total Indian leather good exports stood at US\$ 3.05 billion during April-October 2018. During April-October 2018, the major markets for Indian leather products were US (16.73%), Germany (12.31%), UK (11.41%), Italy (7.48%), and France (5.54%). During April-October 2018, exported products include leather footwear (US\$ 1,293.2 million), leather goods (US\$ 799.47 million), finished leather exports (US\$ 466.76 million), leather garments (US\$ 295.06 million), and leather footwear component (US\$ 196 million) (IBEF (2019)).

## The tanning process

The tanning process is essentially designed to preserve hides and stabilize the material so that it does not rot or harden into

\*Corresponding author E-mail : [dibyendu.datta@nift.ac.in](mailto:dibyendu.datta@nift.ac.in)



an unusable form. The process involves preparing the hide ; scraping it clean of meat, fat, and hair; and optionally applying debilitating lime pastes, bleaching, or pickling the hides to makes it more receptive to tanning. The difference between a tanned hide and a rawhide can be assessed based on their reactions to heat and water. Rawhide is animal skin that has not been exposed to tanning. Rawhide will harden in the heat and, putrefy when rewetted. On the other hand, tanned leather remains flexible in heat and does not putrefy when wetted. There are a number of different tanning methods available, depending on the attributes and uses of the final product (Covington, 2009). The methods are:

- § **Vegetable-tanned leather** uses tannins found in vegetables, tree bark, and other naturally plant-derived sources. These chemicals produce soft brown leather that is ideal for leather carving and stamping but is very unstable in water. When bathed in hot water, vegetable-tanned leather will shrink and harden drastically, which is why it was once used as both an early form of plate armor as well as for bookbinding.
- § **Synthetic-tanned leather** is often used as a chromium-tanning alternative. Synthetic tanners are aromatic syntheses artificially produced. Examples include formaldehyde, glutaraldehyde, acrylates, and phenols. The synthetic tanning method is not used as an isolated tanning process, but mainly as part of a combination tanning process with either chromium or vegetable tanning. Chrome leather production ensures retanning with synthetic tanning agents as they provide the necessary 'fullness' to the leather. It is easy to spot this kind of leather by its creamy white colour. After tanning, when the leather is still wet and not dyed, it gets a bright colour and hence is referred to as wet white.
- § **Alum-tanned leather** is produced using aluminum salts (alum) mixed with natural binding agents like flour or egg yolks. The mineral tanning process is also known as 'Tawing' and is one of the oldest tanning processes. After treatment with alum, the dried leather is stiff and firm. The leather is then tumbled and greased to make softer. Far lighter colour shades are possible with alum than vegetable tannins, though the resulting product will be far less supple. Nowadays, it is not usually regarded as 'tanned materials' as it turns putrid in water.
- § **Aldehyde-tanned leather** is the primary alternative to the most popular form of tanning, which uses chromium, instead leveraging glutaraldehyde or oxazolidine. Like synthetic tanned leathers, Aldehyde leather is white in colour. It is also very water absorbent, soft, and can be machine washed, making them perfect for use in chamois.
- § **Chromium-tanned leather** is the most popular form of producing leather and one of the most noxious. It relies on a toxic slush of chromium salts and tanning liquor to produce a supple and often light blue coloured product. The prepared hides are first pickled in a vat of chromium until the material's pH drops to 2.8 - 3.2, and then they are transferred to a secondary vat filled with tanning liquor, which penetrates the leather. Once the liquor is evenly absorbed, the pH of the vat is increased between 3.8 and 4.2. This fixes the tanning material to the leather at a molecular level and helps reduce the amount of shrinkage experienced when the leather is submerged in warm water.

Once the tanning operation is complete, the leather is allowed to dry and the 'crusting' procedure begins. The leather may be thinned, retanned, and lubricated before being coloured, softened, and shaped.

### Objectives

This paper focuses on the lack of comprehensive information and literature on the detrimental effects of the leather industry on human health. To minimize these health risks and improve the health of the working or living population near the tanneries, it is important to learn and measure the burden of pollution that the leather industry contributes. Tannery waste contaminates the air, soil, and water and causes serious health problems. Exposure to such a contaminated environment has led to a variety of disease processes, including dermatitis, asthma, hepatic and neurological disorders, and various malignancies. Overall research on the effects of pollution from leather industries and its related health problems on the population and the specific discharge standards for tanning industry effluents have been discussed.

### Methods

This work is based on a review of literature related to the effects of the leather industry on human and environmental health.



The information was collected from books, annual report, and journals relating to the leather industry. Opinions expressed in the newspaper and different publications have been used in this study. A set of recommendations for improving the situation and rectification of environmental health problem has been discussed.

## Review of literature

### Leather manufacturing and environment

The tanning industry poses many dangers to both the environment and those that work within it. The primary environmental threat involves the dumping of solid and liquid waste that contains leftover chromium and other hazardous compounds (Balasubramanian, 2019). This is common in regions without strong environmental protection standards. Even in fully modernized and carefully managed facilities, it is nearly impossible to reclaim all of the pollutants generated by the tanning process. As a rule of thumb, tanning one ton of hide typically results in 20 to 80 cubic meters of wastewater with chromium concentrations around 250 mg/L and sulphide concentrations at roughly 500 mg/L, not to mention the offal effluence from the preparation phase and the pesticides often added to keep mold growth down during transport to the facility. Eventually, 70% of the untreated hide is discarded as solid waste; hair, fat, meat, sinew, everything goes straight into the trash (Gardetti, 2018).

There are certainly ways to mitigate these effects. The 'Chrome Management in the Tanyard' a report of the United Nations Industrial Development Organization (UNIDO) suggests industry proven techniques of direct recycling of same chromium bath for both the initial tanning and subsequent re-tanning stage, reducing chromium levels in wastewater by 21%. In addition, by reclaiming chromium, either by rapidly precipitating it out of the acid bath using sodium hydroxide or sodium carbonate or slowly pulling it out with magnesium oxide, one can recapture at least 25 - 30% of the bath's chrome content. A study conducted during 2002 for 540 Indian tanneries suggests that a mixture of 70% new chromium and 30% recaptured chrome produces almost the same results as 100% new chromium (UNIDO, 2019).

The UNIDO study authors wrote, 'even though the chrome pollution load can be decreased by 94% on introducing advanced technologies, the minimum residual load 0.15 kg/t

rawhide can still cause difficulties when using landfills and composting sludge from wastewater treatment on account of the regulations currently in force in some countries'. All these advanced recovery techniques require investment for proper implementation and many developing nations are unable to set up such technologies for environmental protection. Therefore, in regions where such regulations are relaxed or easily bypassed, tanneries are still throwing the chrome out with the bathwater.

Wastewater pollution is primarily a byproduct of the initial preparation or beamhouse stage, wherein bits of flesh, hair, mold, poop, and other animal byproducts are mixed into wash water and discarded. Minute doses of chromium are needed to regulate metabolic functions. However, in large doses, when chromium-laced waste is dumped into regional water systems, it can damage fish gills, incite respiratory problems, infections, infertility, and birth defects. It can also instigate a number of serious cancers throughout the food chain (Parsa, 2012).

### The effect on its makers

Working in the tannery, itself is hazardous. Often it is due to inadequate or non-existent worker protection. These include slips and falls on improperly drained floors; exposure to lime, tanning liquor, acids, bases, solvents, disinfectants, and other noxious chemicals; injury from heavy machinery or flaying knives are all terrifyingly real hazards. Still, the most dangerous part of modern tanning is handling chromium. In humans, chromium causes a myriad of ailments depending on how it is absorbed. When inhaled, chromium acts as a lung irritant and carcinogen, affecting the upper respiratory tract, obstructing airways, and increasing the chances of developing lung, nasal, or sinus cancer. Chromium normally is absorbed this way as fine particulate dust that is produced when both raw and tanned leathers are buffed, smoothed, and ground up. Chromium has been linked to increased rates of asthma, bronchitis, polyps of the upper respiratory tract, pharyngitis, and the enlargement of the hilar region and lymph nodes (Tare, 2003; Mushahary, 2003).

Additionally, the raw hides are also a breeding ground for anthrax, which can easily make the leap to humans by mixing with aerosolized pollution, though this has been virtually eliminated in many of tanning industry now that hides are disinfected before being shipped for processing (McConnell, 1942).



It does not play well with human skin either. Once absorbed through unprotected handling, chromium can cause dry, cracked, and scaled skin; as well as erosive ulcerations that refuse to heal known 'chrome holes'. and should one become sensitive to chromium exposure, contact with it will result in swelling and inflammation known as allergic dermatitis (Hedberg, 2018).

Back in 1980, nobody outside of the tanning industry had any inkling that the work they were doing might be making them sick. In fact, a 1981 study by the International Agency for Research on Cancer (IARC) found no link between the tanning process and nasal cancer in tannery workers. However, over the next few years, additional case reports and studies began uncovering a link not just to nasal cancer but bladder and testicular cancer as well, which was associated with the dyes or solvents employed in the finishing process. By the mid-1990s, a number of other forms, including lung and pancreatic cancer, both of which are way down the list of cancers you might survive, were associated with leather dust and tanning. By the start of this century, researchers had uncovered another link between Hexavalent Chromium or Cr (VI) compounds and increased risk of respiratory cancer. Hexavalent Chromium is the +6 oxidation state of the element, a purely manufactured form of the ore that is not found in nature and inherently more unstable than the natural +3 oxidation state. Once common throughout the tanning industry, as well as the automotive industry, Cr (VI) has been labeled as a known human carcinogen by the EPA, the US Department of Health and Human Services (DHHS), the IARC, and the WHO, and has become strictly regulated, verging on outright banning. Germany, in fact, went ahead and actually banned the oxide's use in leather goods, capping contamination at just 3 ppm, back in 2010. A number of studies since 1980s have suggested, Cr (VI) toxicity appears to be an additive process with more severe issues developing and worsening over years of exposure (El-Kady, 2018).

Although it must be acknowledged that the burgeoning expansion of the leather sector is offering new employment opportunities to a number of people along with major contributions to the growing economy, it must also be borne in mind that this mushrooming growth is not without a cost in the form of significant implications for the environment and health of the local people. Whereas developed countries have more stringent environmental control regulations in place to check the process of industrial waste production and disposal, the developing world has to bear the brunt because of increased

demands for exports of tanned leather. The uncontrolled discharge of untreated effluent from tanneries is a growing problem, in leather industry, resulting in severe environmental deterioration as untreated effluent is being released into nearby reservoirs (Syed, et.al. (2010).

## Discussions

### Environmental impact of the leather industry

Raising animals for food and leather requires huge amounts of feed, pastureland, water, and fossil fuels. Animals on factory farms produce 130 times as much excrement as the entire human population, without the benefit of waste treatment plants. The U.S. Environmental Protection Agency (EPA) has even acknowledged that livestock pollution is the greatest threat to our waterways.

Although some leather makers deceptively tout their products as 'eco-friendly', turning skin into leather also requires massive amounts of energy and dangerous chemicals, including mineral salts, formaldehyde, coal-tar derivatives, and various oils, dyes, and finishes, some of them cyanide-based. Most leather produced is chrome-tanned, and all wastes containing chromium are considered hazardous by the EPA.

Tannery effluent contains large amounts of pollutants, such as salt, lime sludge, sulphides, and acids. The process of tanning stabilizes the collagen or protein fibers in skins so that they actually stop biodegrading.

People who work in and live near tanneries suffer, too. Many die of cancer possibly caused by exposure to toxic chemicals used to process and dye the leather. The Centers for Disease Control and Prevention found that the incidence of leukemia among residents near one tannery in Kentucky was five times the U.S. average.

Arsenic, a common tannery chemical, has long been associated with lung cancer in workers who are exposed to it on a regular basis. Studies of leather-tannery workers in Sweden and Italy found cancer risks.

In addition, raising the animals whose skin eventually becomes leather requires vast quantities of water and wide tracts of pastureland, which must be cleared of trees. In fact, in the last half-century, 70% of the Amazon rainforest has been cleared to

make way for pastures or for growing feed crops. This mass deforestation causes habitat loss for millions of species, eliminates the Earth's tree canopy, and drives climate change. Animal agriculture and its methane and nitrous oxide rich products, including leather, are leading contributors to climate change. Globally, animal agriculture is responsible for more greenhouse gases than all the world's transportation systems combined.

Runoff from feedlots and dairy farms also creates a major source of water pollution. Leather has the greatest impact on eutrophication, a serious ecological problem in which runoff waste creates an overgrowth of plant life in water systems, which suffocates animals by depleting oxygen levels in the water and is the leading cause of hypoxic zones, also known as 'dead zones'. The EPA has confirmed that factory farms account for 70% of water pollution in U.S. Huge amounts of fossil fuels are consumed in livestock production as well, and cow-derived leather has almost three times the negative environmental impact as its synthetic counterparts, including polyurethane leather.

The production of leather hurts animals, the environment, and the workers who manufacture it. The only ones who benefit are people who profit from the misery and suffering of others. Thankfully, there are plenty of sustainable vegan leather options to choose from today that mimic the properties of leather without the cruelty to animals or environmental devastation. The leather industry of Kanpur houses nearly 400 leather tanneries and there is occurrence of snow- like white foam drifting across fields and water canals, nauseating black smoke, and irresistible pungent stink in the air.

The leather industry releases large amounts of toxic chemicals and acidic effluents concentrated with heavy metal chromium, cadmium, lead, arsenic, cobalt, copper, iron, lead, zinc, manganese. All of these highly potent chemicals make their way into the rivers and other water bodies. These toxins not only contaminate the river but also seep in and pollute the soil and groundwater. Most of the discharge overflows and passes into the river. The post-treated water used for irrigation of farmlands is also found to have a devastating effect on crops and vegetables.

### Route of transmission of industrial toxins

Leather tanneries produce three categories of waste: wastewater, solid waste, and air emissions, of which wastewater is by far the most important environmental challenge (Chowdhury, et.al. 2018).

### (a) Wastewater

Wastewater is discharged into the nearby water reservoirs. When used for drinking purposes, this contaminated water can be a source of serious illness in the population. Although the exact quantity varies widely between tanneries, a normal requirement of around 50 to 60 litres of water per kilogram of hide is suggested. Some tanneries consume as much as 3 times this amount of water. This water is then discharged with the addition of chemicals used for treating the hides (Balasubramanian, et.al. 2019). The wastewater from beam house process viz. soaking, liming, deliming, etc., are highly alkaline, containing decomposing organic matter, hair, lime, sulphide and organic nitrogen with high Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). The wastewater from tanyard process viz. pickling, chrome tanning are acidic and coloured. Effluent from vegetable tanning contains high organic matter. The chrome tanning wastes contain high amounts of chromium mostly in the trivalent form. The characteristics of combined wastewater before treatment and after treatment are given in Table 1.

Table 1: Characteristics of wastewater

| Parameters            | Average Concentration in mg/litre |                      |
|-----------------------|-----------------------------------|----------------------|
|                       | (Before Treatment)                | (After Pretreatment) |
| BOD                   | 1850                              | 700                  |
| COD                   | 4500                              | 3000                 |
| Chlorides (Cl)        | 5500                              | 1200                 |
| Suspended Solids (SS) | 3750                              | 1500                 |
| Total Chromium (Cr)   | 165                               | 38                   |

Source :Minimal National Standard for Tanneries, Central Pollution Control Board (CPCB)

The pollution load per tonne of hides and skins process is given in Table 2.

Table 2: Pollution load per tonne of hides/skins processed

| Pollution Parameter      | Pollution Load (kg) |
|--------------------------|---------------------|
| Volume (m <sup>3</sup> ) | 40                  |
| BOD                      | 70                  |
| COD                      | 180                 |
| Chlorides (Cl)           | 270                 |
| Dissolved Solids (DS)    | 600                 |
| Suspended Solids (SS)    | 100                 |
| Sulphides (S)            | 4                   |
| Chromium (Cr)            | 30                  |

Note : Composite wastewater (no segregation)

Source : Central Leather Research Institute (CLRI)



Process-wise generation of wastewater and their characteristics are explained in Table 3 :

Table 3: Characteristics of tannery effluent

| Parameter                               | Soaking       | Beam House Operation | Pickling and Chrome Tanning | Wet finish - Rechroming Dyeing and Fat Liquor | Composite (Including washings) |
|---|---------------|----------------------|-----------------------------|---|--------------------------------|
| Volume of the effluent in litres/ton of | 6000 - 9000   | 6000 - 10000         | 1500 - 3000                 | 3000 - 5000                                   | 30000 - 40000                  |
| pH                                      | 7.5 - 8.0     | 08-Dec               | 2.2 - 4.0                   | 3.5 - 4.5                                     | 7.0 - 9.0                      |
| BOD 5 day at 20°C (Total)               | 1100 - 2500   | 2000 - 8000          | 400 - 800                   | 1000 - 2000                                   | 1200 - 3000                    |
| COD (Total)                             | 3000 - 6000   | 3000 - 15000         | 1000 - 3000                 | 2500 - 7000                                   | 2500 - 8000                    |
| Sulphide (S)                            | -             | 50 - 200             | -                           | -   | 30 - 150                       |
| Total Solids (TS)                       | 35000 - 55000 | 6000 - 20000         | 30000 - 60000               | 4000 - 10000                                  | 15000 - 25000                  |
| Dissolved Solids (DS)                   | 32000 - 48000 | 5000 - 15000         | 29000 - 58000               | 3400 - 9000                                   | 13000 - 20000                  |
| Suspended Solids (SS)                   | 3000 - 7000   | 3000 - 15000         | 1000 - 2000                 | 600 - 1000                                    | 2000 - 5000                    |
| Chlorides (Cl)                          | 15000 - 30000 | 3000 - 6000          | 15000 - 25000               | 500 - 1000                                    | 6000 - 9500                    |
| Total Chromium (Cr)                     | -             | -                    | 1500 - 3000                 | 30 - 60                                       | 80 - 200                       |

1. All values except pH are expressed in mg/L
2. Volume of wastewater applicable for hides (cow and buffalo) and goatskins and not for wool sheepskins
3. Beam House Operation includes liming, reliming, fleshing, deliming

Source: Central Leather Research Institute (CLRI)

#### (a) Solid Waste

Solid waste includes dusted curing salts, raw trimmings, wet trimmings, dry trimmings, wet shavings, dry shavings, buffing, and packaging material. It is estimated that for a tannery averaging 10000 kg of skins per day, a total of some 5500 kg of solid waste is produced per day (Dandira, 2013) Solid wastes deposited inland such as leather chippings, rainwater can remove chemicals from such wastes. Such water can run off to

larger water reservoirs, contaminating even deeper natural water (Vasanthi, 2008). This, in turn, affects the food supply for the entire population when the same water is used for agricultural purposes. Solid waste can be divided into two categories: nontanning and tanning. Nontanning solid wastes come from rawhide, are rich in collagen and fats, and are considered nonhazardous. Tanning solid wastes are from effluent treatment plants, are classified as hazardous materials and have abundant trivalent and hexavalent chrome. Depending on process chrome shaving contain 2.5-5% chromium (Shukla, 1991; Öry, et.al,1997). Chrome shaving dust mainly contains trivalent chromium, which is less toxic compared to hexavalent form.

Solid waste includes salt from raw skin / hide dusting; raw skin/ hide trimmings; hair from the liming / dehairing process, which may contain lime and sulphides; and fleshing from raw skins/ hides. Other solid waste from tannery industry includes wet-blue shavings, containing Chromium (III) oxide ( $Cr_2O_3$ ), wet-blue trimming, which is generated from finishing processes and contains Chromium oxide (CrO), syntans, and dye; and buffing dust, which also contains CrO, syntans, and dye. The reducing characteristics of tannery sludge stabilize Cr (III) with respect to Cr (VI), due to the presence of organic matter and sulphides (Baker, 2018).

Prevention and control measures for solid waste include the following:

- § Reduce inputs of process agents (particularly precipitation agents in wastewater treatment) to the extent practically applicable.
- § Segregate different waste/residue fractions to facilitate recovery and reuse (e.g., to manufacture pet toys, pet food, leather fiberboard).
- § Recycle sludge as compost/soil conditioner or in anaerobic digestions for energy generation. Process sludge may be used for composting / agriculture after appropriate assessment for contaminants and potential impacts to soil and groundwater.

Fleshings could be degraded through bio-methanation process and the research findings of Central Leather Research Institute (CLRI) are encouraging.

#### (b) Air Emissions

There are two sources of air pollution from tanneries (a) Emissions from generators and boilers, (b) Ammonia

emissions that occur during processing and washing of drums (Hashem, 2015). Air emissions quickly diffuse throughout the milieu of the tanneries; this has serious consequences when consideration is given to the fact that most of the tanneries have been established near residential and heavily populated areas. Volatile substances such as hydrogen sulphide may become dissolved in water; they can potentially reach homes of people through sewers. In addition, a major source for risk to people around these tanneries is the air pollution caused by burning tannery residuals. Air emissions from tanning facilities include the following.

Table 4: Sources of air emissions and preventive methods

| Emission to Air                   | Source Operations in Tannery  | Suggestive Methods of Prevention   |
|-----------------------------------|---|--|
| Organic Solvents                  | Degreasing Finishing  | <ul style="list-style-type: none"> <li>Usage of water-based formulations for spray dyeing</li> <li>Usage of roller coating techniques or curtain coating machines wherever applicable</li> </ul> |
|                                   |   | <ul style="list-style-type: none"> <li>Usage of spraying units with economizers and high volume / low-pressure spray guns</li> </ul>   |
|                                   |   | <ul style="list-style-type: none"> <li>Avoid usage of internationally banned solvents</li> </ul>   |
|                                   |   |  |
| Volatile Organic Compounds (VOCs) | Spray-finish Machines Dryers  | <ul style="list-style-type: none"> <li>Usage of wet scrubbers, activated carbon adsorption, bio-filters (to remove odors), cryogenic treatment, and catalytic or thermal oxidation.</li> </ul>   |
| Sulphide (S)                      | Beam house and Effluent treatment   | <ul style="list-style-type: none"> <li>Maintain a basic pH over 10 in the equalization and sulphide oxidation tanks.</li> </ul>  |
|                                   |   | <ul style="list-style-type: none"> <li>Avoid breeding anaerobic conditions in sulphate containing materials</li> </ul>   |
|                                   |   | <ul style="list-style-type: none"> <li>Add manganese sulphate to treated effluent.</li> </ul>  |
|                                   |   | <ul style="list-style-type: none"> <li>Use adequate ventilation</li> </ul>   |
| Ammonia (NH <sub>3</sub> )        | Beam House, Delimiting, Dehairing Drying after dye- penetration                     | <ul style="list-style-type: none"> <li>Adequate ventilation followed by wet scrubbing</li> </ul>   |
| Dust                              | Storage handling of powdery chemicals, Dry shaving, Buffing, Dust removal machines, | <ul style="list-style-type: none"> <li>Centralised system employing cyclones</li> </ul>  |
|                                   |   | <ul style="list-style-type: none"> <li>Usage of scrubbers/bag filters, as needed.</li> </ul>   |

Emissions of sulfur dioxide may occur during bleaching, post-tanning operations, or carbon dioxide (CO<sub>2</sub>) delimiting, but they are not typically a significant source of emissions.

Table 5: Odour emissions to air

| Odorous Emissions to Air             | Source Operations in Tannery   | Suggestive Methods of Prevention   |
|--------------------------------------|--|--|
| Ammonia (NH <sub>3</sub> )           | Beam house operations  | <ul style="list-style-type: none"> <li>Prompt curing of raw hides</li> </ul>   |
| Hydrogen sulphide (H <sub>2</sub> S) | Beam house operations<br>Effluent Treatment Plant (ETP) Collection Tanks | <ul style="list-style-type: none"> <li>Reduce the time that sludge remains in the thickener, dewater thickened sludge by centrifugation or filter press, and dry the resulting filter cake. Sludge containing less than 30% solids may generate especially strong odors</li> </ul> |
|                                      | ETP Primary Treatment Units  |  |
|                                      | ETP Sludge Dewatering System ETP Anaerobic Lagoons                       | <ul style="list-style-type: none"> <li>Ventilate tannery areas and control exhaust from odorous areas (e.g., where wastewater sludge is thickened and dewatered), through use of a biofilter and/or a wet scrubber with acid, alkali, or oxidant</li> </ul>                        |
| Volatile Organic Compounds (VOCs)    | Finishing Operations   |  |
| Methane (CH <sub>4</sub> )           | ETP Anaerobic Lagoons  |  |

Source : Draft report of the Expert Committee on Odor Pollution and its Control, July 2007, CPCB

The focus of Indian environmental regulation centered on water pollution, rather than problems related to air pollution and solid wastes. Moreover, no international environmental regulations were imposed on tanning industry, which made the enforcement and governance of environmental regulations weak and fraudulent in Indian tanning industry (Schjolden, 2000). There is certain domestic standard for pH, total suspended solids, sulphides and chrome that the tannery effluent shall not exceed, which takes care of the negative externalities generated by the tanning industry within the domestic territory. Tanneries are required to treat their effluent before letting it out either to their sewer system or to a river. Compared to the foreign environmental standard to be kept for the discharged effluent of tanneries, India's regulations are almost at par, though less stringent of German restriction in case of total chrome and Italian restriction in case of sulphides. (Table 6)

Table 6 : Environmental standard for tannery discharged effluent imposed by leather producing countries

| Countries | pH      | COD | SS | Sulphides | Total Chrome mg/litre |
|-----------|---------|-----|----|-----------|-----------------------|
| Argentina | 5.5-10  | 250 | NA | 1         | 0.5                   |
| Brazil    | 5.0-9.0 | NA  | NA | 0.2       | 2.5                   |

| Countries | pH      | COD | SS    | Sulphides | Total Chrome mg/litre |
|-----------|---------|-----|-------|-----------|-----------------------|
| China     | 6.0-9.0 | 300 | 200   | 1         | 1.5                   |
| Denmark   | 6.5-8.5 | NA  | 30    | 2         | 0.2                   |
| Germany   | 6.5-10  | 250 | NA    | 1-2       | 0.5-1                 |
| India     | 6.5-9.0 | 250 | 100   | 2         | 2                     |
| Italy     | 5.5-9.5 | 160 | 40-80 | 1         | 2                     |
| Poland    | 5.5-9.0 | 150 | 35    | 0.2       | NA                    |

Source: UNIDO

### Leather industry pollution intensities and environmental damage

Leather industry has been unequivocally stated as a polluting industry throughout the world and almost equivalent pollution norms have been universally implemented by all the major leather producing nations of the world (Table 6). However, no specific pollution intensity measurement overtime has been done so far. Hettige, Martin, Singh, and Wheeler (1995) constructed a Pollution Index while developing Industrial Pollution Projection System (IPPS) of 1,500 product categories produced in 200,000 factories in all regions of U.S. According to this research report, Pollution Index can be interpreted as a ratio of pollution per unit of manufacturing activity. Pollution Index = Waste Output / Total Manufacturing Activity, while manufacturing activity can be defined either in terms of (i) Physical Volume of Output; (ii) Employment; (iii) Real Values of Output. Applying the IPPS definition Pollution Index and using only water pollution load, Pandey and Ghosh (2000) estimated industrial pollution of different industries in India. Computing the pollution load of sixteen pollutive industries, they have shown Leather industry ranks 14th according to Pollution Index (in terms of output intensities) and 2nd (in terms of employment intensities).

Industries are growing at common centres/estates/parks as the resources, workforce, transportation, and marketing is feasible. Generally, medium and small-scale industries are developed at such areas and form industrial clusters. Due to lack of awareness and ignorance of waste management technologies, environmental pollution has resulted in the surrounding environment. Such industrial areas must be assessed in order to improve environmental quality. With this

objective Central Pollution Control Board (CPCB) developed a new pollution index namely, Comprehensive Environmental Pollution Index (CEPI) which captures the range of health dimension of environment including land, air, and water. Way back in 2009-10, 88 prominent industrial clusters across the country were identified in consultation with the Ministry of Environment, Forest and Climate Change (MoEF&CC) for CEPI analysis. Out of identified 88 prominent industrial clusters, 43 industrial clusters in 17 States having CEPI score of 70 and above are identified as Critically Polluted Areas (CPAs). Further, 32 industrial clusters with CEPI scores between 60 and below 70 are categorised as Severely Polluted Areas (SPAs).

In order to assess the environmental quality in the Polluted Industrial Areas (PIAs), monitoring is done periodically by the CPCB through a recognised environmental laboratory and CEPI is assessed based on recorded data. The evaluated CEPI reflects the environmental quality of the industrial areas and serves as a yardstick to assess the progress achieved in the implementation of action plans. So far, three rounds of monitoring have been undertaken by CPCB (2009, 2011, 2013) based on which CEPI assessment was done.

The environmental status of four major leather producing towns/cities namely, Kanpur (78.09), Agra (76.48), Noida (78.90), Jalandhar (64.98) is initially quite critical. The pollution index of the leather producing areas has marginally improved, though the partial impact possibility of other pollutive industries in the respective centers cannot be undermined. An index level score above 60 refers to critical level of pollution in respective of environmental component.

Experts say that despite the action plans, there was hardly any improvement in the pollution levels in these clusters because of which the MoEF&CC had imposed a ban on opening new units and on expansion of existing industries in these areas. On the assurance of various state governments, the ban was later lifted.

In 2016, CEPI was subsequently revised by the CPCB to make the concept of CEPI simple to facilitate the citizens to evaluate the CEPI score. Since the old CEPI had some factors which were difficult to monitor like potentially affected pollution and assessment of health impact, the revised CEPI laid significant weight of 50% of the observed quality of ambient environment in order to have a constant monitoring data of the ambient air quality.

## Impact of the leather industry on human health

Leather and related sectors now represent one of the most important industrial sectors in India, being a significant contributor to the national economy. The main sectors from which its demand is derived are fashion, footwear, furniture, interiors and automotive. While the Indian leather totals upto 13 % of the world's total production of skins, around 10 % of world's footwear production also comes from India. India's leather industry is bestowed with skilled manpower, innovative technology, increasing industry compliance to international environmental standards and the support of allied industries. Dominated primarily by the unorganised sector, the leather industry employs nearly 25 lakh people annually, of which, 80 % are engaged in footwear manufacturing

Many small tanneries cannot afford proper pollution control, and discharge their waste directly into dumpsites or the Ganges river. Under some conditions, the trivalent chromium these wastes contain may become oxidised to hexavalent chromium, which is highly hazardous to both human and animal health. Hexavalent chromium levels in the Ganges near Kapur are about 6.2 milligrams per liter, well over India's government-mandated limit of 0.05 milligrams per liter. Preventing these kinds of pollution problems requires stricter standards in developing nations and possibly training for tannery owners and operators to ensure they know how to properly dispose of their waste. Varying prevalence of asthma (2.2% to 38%) among leather tannery workers in India has been reported previously with moderate to high exposures at workplace found to be significantly associated with asthma (Shukla, 1991; Öry, et.al,1997).

A number of studies have been done on child labour in India and the consequences of occupational exposures. India has the largest number of rural and urban child workers in the world. Children are employed in the manufacture of shoes, particularly in Agra. It is estimated that as many as 25000 children may be involved in making shoes. Children work at home where they are not only exposed to cramped, poorly ventilated environments but also come into physical contact with industrial adhesives or breathe vapour from glue. Other detrimental physical factors that merit consideration include contact with sharp needles and eyestrain, headaches, poor illumination, noise, and chemicals such as leather dust, benzene, chromium salts, mineral oils, dye extracts, organic solvents, n-

hexane, cyclohexane, and methyl ethyl ketone for neurotoxicity, and p-tert-butylphenols for skin ailments. Occupational cancers like cancers of nose, nasal sinuses, larynx, lung, and gallbladder, hematological disorders like aplastic anemia and leukemia, neurological impairment related to decreased nerve conduction velocity, dermatological disorders such as occupational vitiligo and dermatitis, and musculoskeletal problems such as carpal tunnel syndrome are all health risks related to leather industry. The psychological dimension contributed by the stress of work also affects the overall health of workers (Tiwari, 2005).

An interview-based study investigated 40 children employed in the small-scale leather industry in Calcutta, along with a control group of 40 nonworking male children of the same age group, locality, and socioeconomic class. Three health problems; low back and ankle pain, dizziness, and tingling pain in the hands were found in a significantly higher proportion in the working children. It is possible that the particular sitting posture of the child workers for long working hours and the chemical nature of the glue and solvents used in this industry were responsible for these manifestations in the working children. Occurrence of specific signs and symptoms of nutritional deficiency such as Bitot's spot, night blindness, glossitis, angular stomatitis, and dental caries were found more commonly in the working children compared with the control group, although the difference was not statistically significant (Mitra, 1993).

An interview study focusing on the socio-cultural factors affecting child labourers in the footwear industry revealed that poverty was the main cause of child employment. The overall effects of such labour were lack of education and lowering of aspirations of children. Taking the number of working hours-to-pay ratio into account, children are probably the worst paid among labourers (Mitra, 1994).

## Cleaner production of the leather industry

The concept of cleaner production is defined by United Nations Environment Programme (UNEP) as 'the continuous application of an integrated environmental strategy to processes, products, and services to increase efficiency and reduce risks to humans and the environment'. Unlike the traditional pollution control methods, cleaner production aims to minimize environmental effects due to production by preventing/reducing waste at the source. This approach is a production strategy that implies economic returns besides environmental benefits and aims



productivity increases. Various organizations and individuals use the concepts of cleaner production, eco-efficiency, waste minimization, pollution prevention, and green productivity interchangeably. The first steps concerning the cleaner production concept began in the late 1990s and within the ongoing period, several organizations have started studies about the subject. Moreover, the cleaner production concept has been included in many strategy documents prepared in recent years by the government.

Cleaner production is an efficient method of preventing or minimizing pollution caused by industrial activities. UNIDO continues to place an emphasis on the introduction of cleaner leather processing technology in developing countries. The primary task of all cleaner technologies is to reduce the amount of pollution emissions; and where possible change the nature of pollution emissions to reduce the pressure and costs of end-of-pipe treatment. The expected results primarily include:

- § Lower water consumption – better preservation of rapidly diminishing water resources.
- § Lower total dissolved solids (TDS) content (including salinity) – lower risk of affecting the usability of the receiving water bodies for irrigation and livestock watering.
- § Avoidance of use in processing and/or presence in leather of substances from the Restricted Substances Lists (RSL) promulgated by national or regional legislation, leading (multinational) brands and/or ecolabel due to their proven negative impact on human health and ecosystems.
- § Proportionally higher volume of solid wastes suitable for processing into saleable by-products.
- § Lower levels of BOD, COD, and Nitrogen; their respective contents in conformity with local and widely prevailing legislative norms.
- § Low level of chromium in Common ETP sludge – the scope for land application and/or composting.
- § Lower hazardous and/or unpleasant air emissions.
- § Appropriate Occupational Health and Safety (OSH) standards – better work conditions, fewer accidents.

Cleaner production is the conceptual and practical approach to reducing environmental impact from human activities through better use of resources, methods, technologies and, above all, management of processes and activities. Cleaner production is applicable to products, processes, and services. Cleaner production is applicable at various points in the activity line between thinking of the need for and designing a product and the disposal of that product at the end of its life cycle. It can be achieved:

- § through demand management.
- § through materials choice.
- § through least impact design.
- § through least impact utilization.
- § through reuse, recycling, recovery.
- § over entire life cycle.

Many examples proving the validity of the Cleaner Production approach have been generated over the past 25 years, both in the 'developed' world as well as in the 'developing' world. The message invariably is the same: Cleaner Production may result in enhanced industrial economic efficiency because of improved raw material usage, and improved environmental efficiency because of reduced production of waste materials. Both aspects lead to cost savings and, therefore, to an improved financial position (Gavrilescu, 2004)

### Recommendations for improving the situation

Man's unbridled zest and passion for progress can sometimes cause more harm than good. A case in point is the environmental pollution that is increasingly damaging the environment and human health in the face of major technological development in the 21st century. For developing countries, it is a major issue that needs to be addressed. Lack of resources allocated exclusively for environmental health in these regions makes this a difficult task. Another very important issue that needs consideration is the double morality in the developed nations. In these technologically advanced nations, fervent debate and scrutiny have resulted in the promulgation of environmental and labour legislation, placing significant infrastructure restrictions on the industries of the regions. The downfall is that this very factor when compounded with lower salaries and little stress on provision of social and occupational protection for workers, had led to establishment of the most polluting industries in developing countries. In developing countries,





there is a dearth of investment in industrial safety. The fundamental clash between environment and profitability is highlighted by this dilemma. However, development should occur in such a way that it meets the needs of the present and permits future generations to meet their needs as well (Khan, 2001).

The various literature review has revealed tangibly worrisome evidence on the hazardous impact of the leather industry on human health. Much of the workforce is especially at risk because of a number of possible factors such as natural vulnerability to disease, occupational exposure, and lack of education. Other health hazards represent potentially preventable health targets; preventing them can, in turn, lessen the burden on the health care system. This has important implications for a country like India. It is found that occupational health is often a neglected arena despite the massive growth of industrial sector in the country in recent years. Research studies regarding the occupational health hazards are rare, with virtually no studies on leather industry. In order to introduce effective protective measures, pollution levels have to be assessed and the health hazards identified and quantified. Some of the recommendations for the improvement of the situation and long-term sustainability of the leather industry are given below.

## § Environment-friendly tanneries

Measures should be taken to assess the pollutant levels and introduce measures to control tanneries pollution. Cities that have a high concentration of leather tanneries should also have an agency for the removal, safe drainage, and collection of effluent from these tanneries. Tanneries should be established as far away from populated areas or residential belts as possible to minimize exposure of these populations to industrial waste. Meticulous care and planning are also needed to ensure that effluent water does not mix with the drinking water supply. In addition, effluent treatment plants and solid waste disposal systems should be established near the tanneries to prevent the discharge of waste into uncontaminated reserves.

## § Environmental education

Patient education forms the backbone of any successful disease prevention and health promotion program. Informing workers and residents of areas around tanneries about possible health hazards arising from leather tanneries is imperative. Since literacy is generally low, educational campaigns need to be

prepared in simple jargon for maximum comprehension by the masses. The importance of properly handling, vigorously washing, carefully sieving, and thoroughly cooking the food items should also be driven home as improper techniques in this regard may lead to persistence of some toxins in food.

## § Protective equipment

Protective clothing equipment should be provided to workers as it can help reduce dermatological problems such as contact dermatitis. Masks should be provided to help prevent direct exposure to airborne chemicals like Dimethylformamide (DMF).

## § Technical skills

Tanner's managerial and technical skills should be improved through specially designed courses. Regular courses on the same subject need to be organised by companies managing these tanneries.

## § Increased research

More funds should be allocated and research conducted on health hazards in the leather industry to gain data that can be translated into effective preventive programs. Special laboratories can be set in the cities having a large number of tanneries to examine samples from water bodies and air near tanneries to determine existing level of contamination. Such audits are important for policy formulation as well. Also, the effect of health and hygiene interventions (e.g., daily bathing after returning from work) needs to be assessed and accordingly universally applied if found to be effective. Such an approach has been studied in other occupational diseases (e.g., testicular cancer from soot), so it may be worthwhile to extrapolate the investigation of the same for tannery hazards as well (Rastogi, 2007).

## § International and local protocols

Local protocols and occupational health regulations should be formulated and published. These should take into account the quality standards for protecting human health. In addition, there is a need to develop and subsequently apply international protocols that oblige companies to observe strict environmental and occupational safety standards when they establish themselves or perform the trade.

## § Child labour

The practice of child labour, a dismal reality in many countries, should be abolished. Children should be offered a stipend for the hours spent in academic training and instruction so that they do not have to engage in labour. Social uplift and development of the education sector need to be made a priority for the achievement of this purpose. Also, companies have a moral obligation not to encourage such deplorable practices.

## § Aid for improving infrastructures

International aid should be disbursed through transparent agencies for the improvement in infrastructure to tackle environment-related problems such as wastewater purification treatment and management of dangerous wastes, etc.

## § Training of health care workers

Health care professionals should be trained to manage occupation related morbidity. Companies should ensure pre-employment and regular check-ups of the workers to aid in the early detection of any occupational morbidity. Worksite interventions, such as smoking and alcohol cessation programs, can be advocated by health care professionals. Healthier lifestyle choices should be encouraged among the workers. Worksite programs are more successful in compare to clinic-based programs.

## § Community participation

Successful community participation in social uplift programs is important for the improvement of education, alleviation of poverty and abolishment of child labour. Similarly, simple and effective small-scale projects aimed at improving sanitation and hygiene in communities located in the proximity of leather industries can be initiated only with the support of these communities.

## § Integration of novel research

Novel research in waste management should be integrated when designing waste management protocols and strategies. Introduction of eco-friendly dyes derived from natural sources; technique of 'depollution' of solid chromium leather waste by use of organic chelates such as potassium oxalate, potassium tartarate, and acetic and citric acids can be initiated (Malek et.al.,2009). A

study in Italy has shown that leather production units utilizing tannins may be more environmentally friendly as compared to chromium based processing (Pagano et.al. 2008). Such a change in processing practices may be considered in the future.

## Conclusion

International consumers and national governments are increasingly applying ever more stringent demands on producers to manufacture according to environmentally benign practices. A major proportion of the pollution generated in beamhouse processes can be avoided by adjusting floats and addition of chemicals for each process and by implementing, wherever possible, clean technologies. By using clean technologies, savings in chemical can be achieved, which enable short payback of investment costs. A reduction in discharged pollution will allow the effluent treatment plant to be operated more economically, providing a better effluent quality.

The sector is confronted with substantial sustainability challenges in the supply chain. Research shows that sustainability has real business benefits when conscientiously integrated into business operations. The challenge is to extrapolate these solutions to the entire supply chain, whilst maintaining a competitive advantage. Companies should work cooperatively towards identifying sustainable business models and creating a sustainable supply chain.

A proportion of pollution generated from leather manufacturing can be contributed to the inefficiency of chemical use in leather processing and to organic substances derived from the hides during processing. In particular, the overall tanning processes can be characterised by high consumption of water and tanning agents, most of which are found in the final wastewater. To increase the efficiency of leather production, chromium is added in excess and is only partly taken up by the leather. Significant chromium savings can be achieved by applying modern chrome recovery and recycling technologies, thus reducing environmental impacts.

## References:

- [1]. Baker, I. (2018). Leather. In *Fifty Materials That Make the World* (pp. 117-120). Springer, Cham.
- [2]. Balasubramanian, P., Vedhanayagam, M., Jayakumar, G. C., Sreeram, K. J., Rao, J. R., & Nair, B. U. (2019). Studies



- on Paper and Pulp Industry Waste for Leather Making: An Insight in Converting Waste to Wealth. In *Waste Management and Resource Efficiency* (pp. 571-581). Springer, Singapore.
- [3]. Chowdhury, Z. U. M., Ahmed, T., Antunes, A. P. M., & Paul, H. L. (2018). Environmental Life Cycle Assessment of Leather Processing Industry: A Case Study of Bangladesh. *Journal of the society of leather technologists and chemists*, *102*(1), 18-26.
- [4]. Covington, A. D. C. (2009). *Tanning Chemistry: The Science of Leather*. Royal Society of Chemistry.
- [5]. Dandira, V. S., & Madanhire, I. (2013). Design of a Cleaner Production Framework to Enhance Productivity: Case Study of Leather Company. *International Journal of Science and Research, India*.
- [6]. El-Kady, A. A., & Abdel-Wahhab, M. A. (2018). Occurrence of trace metals in foodstuffs and their health impact. *Trends in Food Science & Technology*.
- [7]. Gardetti, M. A., & Muthu, S. S. (Eds.). (2018). *Green Fashion. Vol 2*. Springer.
- [8]. Gavrilescu, M. (2004). Cleaner production as a tool for sustainable development. *Environmental Engineering & Management Journal*, *3*(1).
- [9]. Gupta, S., Gupta, S., Dhamija, P., & Bag, S. (2018). Sustainability strategies in the Indian leather industry: an empirical analysis. *Benchmarking: An International Journal*, *25*(3), 797-814.
- [10]. Hashem, M. A., Arefin, M. S., & Jor, A. (2015). Gaseous Air Pollutants and its Environmental Effect-Emitted from the Tanning Industry at Hazaribagh, Bangladesh. *Am J Eng Res*, *4*(5), 138-144.
- [11]. Hedberg, Y. S., Erfani, B., Matura, M., & Lidén, C. (2018). Chromium (III) release from chromium tanned leather elicits allergic contact dermatitis: a use test study. *Contact dermatitis*, *78*(5), 307-314.
- [12]. Hettige, H., Martin, P., Singh, M., & Wheeler, D. (1995). The industrial pollution projection system.
- [13]. IBEF (2019). *Leather Industry: Indian Leather Exports & Manufacturers in India*. [online] Available at: <https://www.ibef.org/exports/leather-industry-india.aspx> [Accessed 15 Jan. 2019].
- [14]. Khan, S. R., Khwaja, M. A., & Khan, A. M. (2001). Environmental impacts and mitigation costs associated with cloth and leather exports from Pakistan. *Environment and Development Economics*, *6*(3), 383-403.
- [15]. Malek, A., Hachemi, M., & Didier, V. (2009). New approach of depollution of solid chromium leather waste by the use of organic chelates: economical and environmental impacts. *Journal of hazardous materials*, *170*(1), 156-162.
- [16]. McConnell, W. J., Fehnel, J. W., & Ferry, J. J. (1942). Potential Health Hazards of the Leather Industry. *Journal of Industrial Hygiene and Toxicology*, *24*(5), 93-108.
- [17]. Mitra, S. (1993). A study of the health conditions of child workers in a small scale leather industry in Calcutta. *Occupational and Environmental Medicine*, *50*(10), 938-940.
- [18]. Mitra, S. (1994). Factors in the sociocultural environment of child labourers: a study in a small scale leather goods industry in Calcutta. *Occupational and environmental medicine*, *51*(12), 822-825.
- [19]. Mushahary, J., & Mirunalini, V. (2003). Waste management in leather industry - environmental and health effects and suggestions to use in construction purposes. *International Journal of Civil Engineering and Technology*, *8*(4), 1394-1401
- [20]. Öry, F. G., Rahman, F. U., Katagade, V., Shukla, A., & Burdorf, A. (1997). Respiratory disorders, skin complaints, and low-back trouble among tannery workers in Kanpur, India. *American Industrial Hygiene Association Journal*, *58*(10), 740-746.
- [21]. Pagano, G., Castello, G., Gallo, M., Borriello, I., & Guida, M. (2008). Complex mixture-associated hormesis and toxicity: the case of leather tanning industry. *Dose-Response*, *6*(4), dose-response.
- [22]. Pandey, R., & Ghosh, S. (2000). Estimating industrial pollution in India: implications for an effluent charge. *National Institute of Public Finance and Policy, New Delhi*.



- [23]. Parsa, N. (2012). Environmental factors inducing human cancers. □Iranian journal of public health, □41(11), 1.
- [24]. Rastogi, S. K., Kesavachandran, C., Mahdi, F., & Pandey, A. (2007). Occupational cancers in leather tanning industries: A short review. □Indian journal of occupational and environmental medicine, □11(1), 3.
- [25]. Schjolden, A. (2000). □Leather tanning in India: Environmental regulations and firms' compliance. University of Oslo, Department of Sociology and Human Geography.
- [26]. Shukla, A., Kumar, S., & Öry, F. G. (1991). Occupational health and the environment in an urban slum in India. □Social Science & Medicine, □33(5), 597-603.
- [27]. Syed, M., Saleem, T., Shuja-ur-Rehman, Iqbal, M. A., Javed, F., Khan, M. B. S., & Sadiq, K. (2010). Effects of leather industry on health and recommendations for improving the situation in Pakistan. □Archives of environmental & occupational health, □65(3), 163-172.
- [28]. Tare, V., Gupta, S., & Bose, P. (2003). Case studies on biological treatment of tannery effluents in India. □Journal of the air & waste management association, □53(8), 976-982.
- [29]. Tiwari, R. R. (2005). Child labour in footwear industry: Possible occupational health hazards. □Indian Journal of Occupational and Environmental Medicine, □9(1), 7.
- [30]. UNIDO. (2019). □Chrome Management in the Tanyard. [online] Available at: <https://leatherpanel.org/content/chrome-management-tanyard> [Accessed 15 Jan. 2019].
- [31]. Vasanthi, P., Kaliappan, S., & Srinivasaraghavan, R. (2008). Impact of poor solid waste management on ground water. □Environmental monitoring and assessment, □143(1-3), 227-238.

JILTA



We imagine high-quality shoe & leather care to be customizable to every customer's demand

Leather is a fascinating product that needs regular care to reach and maintain its optimum condition. General use causes cracking, delamination and discoloration, all of which can be prevented by proper cleaning and protection. Stahl's range of Shoe & Leather Aftercare products brings out the best of your leather items and makes them more durable at the same time.

**Enhanced resistance and easy cleaning**

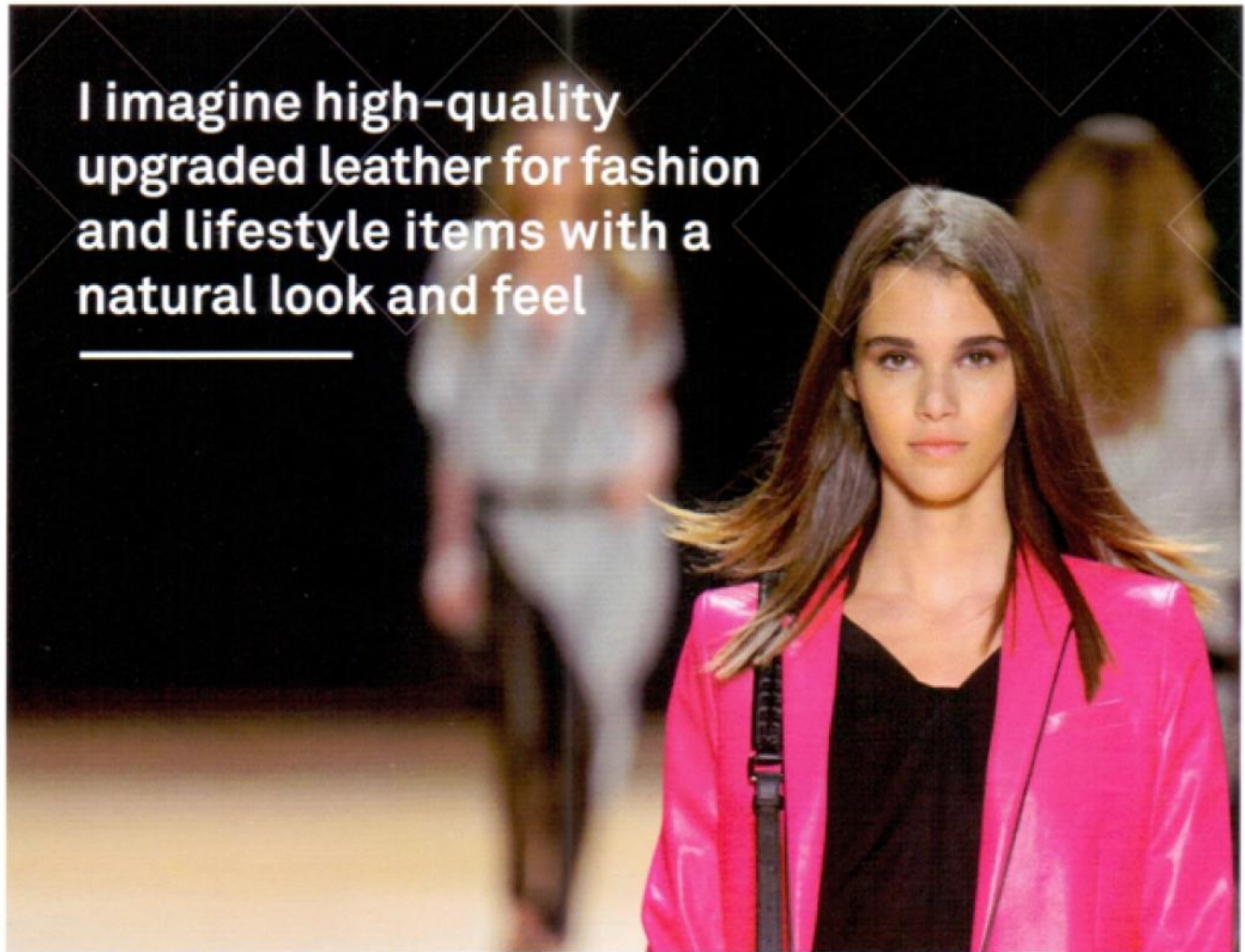
Whether it's for automotive upholstery, footwear, garments, leather goods or upholstered furniture, our products are shielding leather by creating an invisible, breathable barrier that enhances stain resistance and easy cleaning.

The range includes products for cleaning, protecting, refinishing and repairing. We even have solutions to upgrade your leather product so that it fits the latest fashion trends.

There is no such thing as one size fits all, so all of our solutions are available in endless and customizable variations in order to meet all your requirements. Curious what our Shoe & Leather Aftercare solutions can do for your business? Please visit [www.stahl.com](http://www.stahl.com) or contact us at [stahl.india@stahl.com](mailto:stahl.india@stahl.com).

If it can be imagined, it can be created.

I imagine high-quality  
upgraded leather for fashion  
and lifestyle items with a  
natural look and feel



At Stahl, we love high-quality leather with a natural look and outstanding credentials. We want leather to be soft on the skin and both a pleasure to wear and to look at. To increase the availability of such leather we developed Stahl Easy-KAT: an easy-to-use, water-based leather upgrading product range for hides with small to medium grain defects.

#### Effective upgrading for high-quality leather

Easy-KAT enables tanners to widen their horizon by producing more leather that retains its luxurious appearance over time. Small imperfections in a hide, such as scratches and insect damage, are eliminated without affecting the suppleness, appearance or feel of the finished leather. The secret of

Easy-KAT is its natural affinity to anionic substrates and great sealing and levelling power, resulting in soft and flexible leather with all its natural aspects preserved. From high gloss to matt leather – anything is possible.

Easy-KAT is suitable for any type of crust. The finished leather is perfect for high-end fashion items, such as shoes, bags, garments, and jackets. Leather items tanned with Easy-KAT are the items consumers love to wear or carry. Curious what Easy-KAT can do for your business? Please visit [www.stahl.com](http://www.stahl.com) or contact us at [stahl.india@stahl.com](mailto:stahl.india@stahl.com).

If it can be imagined, it can be created.



## Stahl continues sustainability seminars to contribute to transparency in leather supply chain in India

**Waalwijk, The Netherlands, XX December 2018 - Stahl resumed its commitment to putting transparency into action with sustainability seminars in India. From December 4 to December 8 Michael Costello, Director Sustainability at Stahl, led the leather seminars in Chennai, Kanpur, Kolkata and Ranipet. With these seminars Stahl aims to familiarize local professionals with its sustainability philosophy for the industry and related sustainable solutions. The seminars attracted an average of 350 people per seminar.**

The seminars included informative presentations from UNIDO, the Leather Working Group, Solidaridad, CLRI and Stahl. Various important topics like safety & occupational health and the improvement of the environmental footprint of tannery operations in India have been addressed. Solidaridad updated the attendants on the progress with the Ganges Public Private Partnership project launched with Stahl, PUM and CLRI in 2017. The new elements of the LWG audit protocol were then introduced, with an emphasis on housekeeping and the chemicals management module (CMM), which is currently being implemented at tanneries.

Stahl presented the latest news on chemicals management, including information on how the ZDHC Gateway portal will work, and peeked into the future with a look at the recently agreed rules around Life Cycle Assessment calculations for leather manufacturing. The final discussion centered around the interesting views on fashion leather and sustainability as expressed by a group of Global Luxury Management students who received training at Stahl Campus® in March 2018.

"We are pleased but not surprised at the high attendance of our seminars this year" said Mr. Tuncay Deriner, General Manager of Stahl India. "It indicates the importance of these topics for the local tanning sector. The issues that were discussed around safety, housekeeping and water effluent are critical for the sustainability of our industry. Stahl is committed to taking action on them and to working closely with its customers and other stakeholders, to enhance the image and sustainability of leather."

Michael Costello, Stahl's Director of Sustainability added "We always receive such positive reactions from the attendants of these seminars that we are committed to continuing them into the future. Our focus is on promoting good practices and transparency in the industry, which in turn leads to a higher level of environmental stewardship. These seminars provide an excellent vehicle for achieving this goal in India and other countries where we are active."

---

**Note for the editor:**

For more information please contact:  
Anne ter Braak, Communication Manager Stahl  
E [anne.terbraak@stahl.com](mailto:anne.terbraak@stahl.com)  
T +31 416 689 259  
M +31 611 514 839

---

**About Stahl**

Stahl is the world market leader in surface treatment and coating solutions for a wide variety of materials. We are active in differentiated high-margin niches, providing technology-driven solutions and a unique service model for premium applications. Our innovative products give the ultimate level of appeal, functionality, durability and comfort while reducing environmental impact. Although they do not realize it, hundreds of millions of people around the world touch and use Stahl products every day.







# Nitrogen disposal through solid waste and liquid waste generated from the Leather Industry - A case study in Calcutta Leather Complex

Sudin Pal<sup>1\*</sup>, Sanjoy Chakraborty<sup>1</sup>, Buddhadeb Chattopadhyay<sup>2</sup> & Subhra Kumar Mukhopadhyay<sup>1</sup>



ECOTOXICOLOGY PROJECT LABORATORY, GOVT. COLLEGE OF ENGINEERING & LEATHER TECHNOLOGY, KOLKATA,

<sup>2</sup>MCKV INSTITUTE OF ENGINEERING, 243, G. T. ROAD, LILUAH, HOWRAH-711204, INDIA.

## Introduction:

The by-products of meat and meat products industry are the raw materials (hides and skins) of leather industry. Thus, in this respect it is an environmentally friendly industry. However, the leather industry has been also blamed for its negative impacts on the environment due to the bad smell, organic wastes, disposal of different inorganic salts and metal rich chemicals with waste materials. Worldwide at present about 6.5 million tons per year of hides and skins are produced and for its processing about 3.5 million tons of different chemicals are used. At the time of the of 1 ton raw hides and skins processing 800kg of solid waste C<sup>o</sup> 45-50m<sup>3</sup> of the liquid waste are discharged Ozgunay et al. (2007). India contribute 12.93% of the world's leather production of hides/skins that annually amounts to 300 million m<sup>2</sup>. Also, India ranks second in terms of footwear and leather garments production and accounts for 9.57% of the world's footwear production. At present C<sup>o</sup> 574,800 pieces of hides and skins are produced daily by the country of which West Bengal produced 80,000 pieces d<sup>-1</sup>, representing 13.92% share in leather production. India share 21% of cattle-buffalo and 11% goat-sheep livestock population in the world. Whereas, the West Bengal's share in cattle, buffalo, goat and sheep are 8.0%, 1.5%, 11.4% and 2.2% respectively against India. In India nearly 2.5 million people are involved with this leather industry and in West Bengal about 3 laks artisans are engaged in of leather industry. In West Bengal the main leather industry are developed in Kolkata city. In the past, the main leather industries of West Bengal are developed in Tangra, Topsia and Tiljala area of Kolkata city. But, for the Honorable Supreme Court verdict due to pollution related issues the leather industries

are shifted nearly 20 km away from Kolkata city at Kolkata Leather Complex (KLC), Bantala as a separate tannery cluster, setting up appropriate effluent treatment plants. Here in KLC the Government of West Bengal has set up state-of-the-art integrated leather complex spreading over 1100 acres. Kolkata is considered as an important tanning centre of India having total estimated capacity of leather processing is near about 1000 tons raw hides and skins daily (Pal et al., 2015a). As per Puntener (2001) during the processing of every 1 ton wet salted hides and skins, 700 kg solid wastes, 150 kg split, and 30 m<sup>3</sup> of liquid waste were discharged. Ozgunay et al. (2007) and Kanagaraj et al. (2006) has stated that for the processing of 1 ton raw hides and skins more than 600 kg solid wastes of which 80%, 19% and 1% from pre-tanning, tanning and post-tanning operation respectively are generated. Whereas, out of total liquid waste released from the leather industry, 44%, 32% and 24% are shared by pre-tanning, tanning and post-tanning operation respectively (Rivela et al., 2004). Pal et al. (2015b, 2018a) have measured that with this liquid waste and solid waste 40.54 ± 3.22 kg and 279.63 ± 13.23 kg carbon are discharged respectively. Thus, disposal and management of high quality organic matter and various chemicals rich solid and liquid waste are very challenging as both wastes have negative impact on the environment. However, these waste carry luxurious amount of chemicals, which have nutrient value for the biota. Thus, sustainable use of this waste in agriculture and pisciculture will be a good option to manage this huge waste materials. Chattopadhyay et al. (2011) have stated that fleshing, trimmings-splits and chrome shaving dust are used as fish food in pisciculture, garbage-farming, and as fertilizer respectively.

\*Corresponding author E-mail : sudingp1@gmail.com



Nitrogen is a major essential nutrient for all living organisms and depending upon its availability the productivity of terrestrial ecosystems especially the agroecosystems are depends. Especially, nitrate ( $\text{NO}_3^-$ ), which is the major source of nitrogen of plants, is stored in plants vacuoles and took part in protein synthesis (Pal et al., 2016a). However, excess use of nitrogen rich fertilizer leads to environmental difficulties viz. eutrophication, biodiversity loss, stratospheric ozone depletion and global warming. Conversely, limited application leads to low productivity and insufficient food supply. Additionally, nitrogen losses via leaching ( $\text{NO}_3^-$ ) and via emission ( $\text{N}_2\text{O}$  and  $\text{NH}_3$ ) from agricultural field are also a foremost matter of environmental concern. Thus, research and proper management are needed to use nitrogen fertilizer efficiently, to avoid unwanted addition of mineralized nitrogen in soil and losses of nitrogen from soil, and ensure future food security as well as minimize the negative environmental impact.

The solid waste and liquid waste of tannery comprise significant amount of organic and inorganic materials containing enormous amount of nitrogen. The farmers of the East Kolkata Wetland area have been using solid wastes and composite wastewater (tannery generated liquid waste and municipal sewage) for agricultural and piscicultural purpose for the last 100 years and EKW areas produces 150 tons of vegetables daily and 18000 tons fish annually (Ghosh and Sen, 1987; Bunting et al., 2010; Pal et al., 2016b, 2018b). But, in respect of nitrogen no research has been done yet to measure the negative environmental impact and the contribution in global warming, if any, of this nitrogen rich lather waste that are used in the agri-pisciculture practices of EKW area. Thus, before starting of the extensive work the base level study about nitrogen content in the leather solid waste and liquid waste are very essential. From leather industry mainly four types (limed fleshing, chrome-tanned splits, chrome shaving dust, buffing dust) of solid waste and six types (soak liquor, lime liquor, delime liquor, pickle liquor, chrome liquor, fat/dye-fat liquor) of liquid waste are generated. Different nitrogen species (nitrate, nitrite and ammonium) content in each solid and liquid waste of leather industry will surely provide a reference towards more sustainable use of these waste in agri-piscicultural practice to minimize the negative impact of nitrogen in environment.

## Materials and Methods

Four types of solid wastes and six types of liquid wastes and raw hides and skins were collected from three predominant

types of units, viz. gloves, bag, and shoe upper leather producing units at Calcutta Leather Complex (CLC), an industrial complex at Bantala ( $22^\circ 49' 20''$  N,  $88^\circ 51' 46''$  E) in east Kolkata, India. It is located on the boundary of the Ramsar area (No.1208) of East Calcutta Wetland (ECW) ecosystem and it is 20 km from the central business district of Kolkata with an area of about  $4.5\text{km}^2$ . Three units from each gloves, bag and shoe upper producing unit are sampled. In Terson screw cap plastic bottles different liquid wastes were collected and the raw hides and skins and different solid wastes were collected in ziplock pouches.

In laboratory solid samples were dried up at  $60^\circ\text{C}$  in a hot air oven for 3 hours and cut in a very small pieces. Then 1 g each sample taken into a beaker within a 50 ml of water and shake it for 3 hours in a shaker. After that it was filtered through Ultipor N66 Nylon 6, 6 membrane  $0.2\ \mu\text{m}$ , 2 mm filter paper and then it was analysed for  $\text{NO}_2^-$ ,  $\text{NO}_3^-$  and  $\text{NH}_4^+$ , which were loosely attached on the surface of the solid waste, determination in Metrohm 761-Ion-Exchange Chromatograph. For  $\text{NH}_4^+$ , Metrosep C4-125/4.0 column and for  $\text{NO}_2^-$ ,  $\text{NO}_3^-$  Metrosep A supp 5 150/4.0 column are used. On the other hand, after shaking, the 1 g sample from all solid samples were again dried up at  $60^\circ\text{C}$  in a hot air oven for 3 hours. Each samples  $2 \pm 0.10\ \text{mg}$  were weighted in tin foils by Perkin Elmer AD6 Auto Balance. After that to measure the N within it, the samples were dropped into heat combustion chamber of Perkin Elmer CHNS/O analyser (Series II, 2400) (Eaton et al., 2005). The liquid wastes were filtered through Ultipor N66 Nylon 6, 6 membrane  $0.2\ \mu\text{m}$ , 2 mm filter paper and used for  $\text{NO}_2^-$ ,  $\text{NO}_3^-$  and  $\text{NH}_4^+$  analysis in Metrohm 761-Ion-Exchange Chromatograph followed by the standard methods of Jackson (2000). All graphical representation were done by Origin 2016.

## Results and Discussion :

Depending on the weight of raw hides and skin (RHS) and crust and also based on the area of the crust leather the percentage of chemicals are employed in pre tanning, tanning and post tanning operations (Pal et al., 2015a). The quantity of N content in these chemicals and the amount of chemicals that are used in leather processing and directly impact the N output with solid and liquid wastes from different stages of leather processing. The chemicals that are used in post tanning process contribute higher amount of N than pre tanning and tanning operation. In pre tanning and tanning process through Biocides, enzymes,  $\text{NH}_4\text{Cl}$ ,  $(\text{NH}_4)_2\text{SO}_4$ , most of the N are incorporated in the leather processing. Whereas in post tanning process

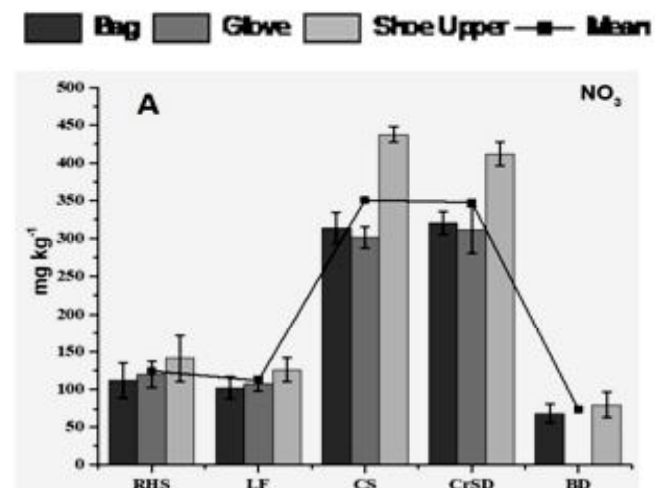
different syntans (resins, melamines, di-isocyanate) different fat liquors, polyurethane lacquers, acrylic lacquers and finishing agents (pigment, acrylic binder, protein, filler, waxes, mucilages, casein, synthetic polymers, albumin etc) are used which contains very high amount of N.

On an average in raw hides and skins (filtrate water)  $124.6 \pm 14.8 \text{ mg kg}^{-1} \text{ NO}_3$ ,  $88.9 \pm 11.6 \text{ mg kg}^{-1} \text{ NO}_2$  and  $240.9 \pm 53 \text{ mg kg}^{-1} \text{ NH}_4$  are present. Whereas, within the raw hides and skin  $123.4 \pm 16.3 \text{ g kg}^{-1} \text{ N}$  are present in form of protein and fat. Moreover, N value are changed depending upon the age, species, breed, habit, habitat and health of the animals. The highest amount of  $\text{NO}_3$  present (filtrate) in chrome tanned split (CS;  $350.8 \pm 75.5 \text{ mg kg}^{-1}$ ) followed by chrome shaving dust (CrSD;  $347.7 \pm 55.8 \text{ mg kg}^{-1}$ ), lime fleshing (LF;  $112.1 \pm 12.1 \text{ mg kg}^{-1}$ ) and buffing dust (BD;  $74.1 \pm 7.9 \text{ mg kg}^{-1}$ ) (Fig. 1A). Whereas, the highest amount of  $\text{NO}_2$  present (filtrate) in CrSD ( $214.9 \pm 25.4 \text{ mg kg}^{-1}$ ) followed by CS ( $211.7 \pm 20.2 \text{ mg kg}^{-1}$ ), LF ( $72.7 \pm 9.3 \text{ mg kg}^{-1}$ ) and BD ( $43.9 \pm 12.1 \text{ mg kg}^{-1}$ ) (Fig. 1B). The trend of  $\text{NH}_4$  concentrations (filtrate) are CrSD ( $1990.6 \pm 118.8 \text{ mg kg}^{-1}$ ) > CS ( $1972.8 \pm 155.6 \text{ mg kg}^{-1}$ ) > BD ( $391.5 \pm 83.9 \text{ mg kg}^{-1}$ ) > LF ( $305.6 \pm 60.7 \text{ mg kg}^{-1}$ ) (Fig. 1C). However, the N concentration in CrSD ( $144.6 \pm 9.1 \text{ g kg}^{-1}$ ), CS ( $137 \pm 13.7 \text{ g kg}^{-1}$ ) and LF ( $110.4 \pm 14.2 \text{ g kg}^{-1}$ ) are not vary too much except in BD ( $61.3 \pm 11.9 \text{ g kg}^{-1}$ ) (Fig. 1D). Furthermore, it is also notable that chemical and mechanical operations and its recipe are different in every tannery. Also, depending upon the customer requirement specific finished product the N species content are varied.

From our study it is observed that among the six waste liquor fat liquor (FL) contain the highest amount of  $\text{NO}_3$  and  $\text{NO}_2$  in all three types (bag, glove, shoe upper) leather producing units. The mean  $\text{NO}_3$  concentration trend is FL (Fat Liquor;  $3.77 \pm 1.2 \text{ mg L}^{-1}$ ) > CrL (Chrome Liquor;  $0.39 \pm 0.1 \text{ mg L}^{-1}$ ) > SL (Soak Liquor;  $0.39 \pm 0.07 \text{ mg L}^{-1}$ ) > LL (Lime Liquor;  $0.28 \pm 0.06 \text{ mg L}^{-1}$ ) > PL ( $0.11 \pm 0.03 \text{ mg L}^{-1}$ ) > DL (Delime Liquor;  $0.1 \pm 0.01 \text{ mg L}^{-1}$ ) (Fig. 2A). Whereas, except FL ( $2.83 \pm 0.78 \text{ mg L}^{-1}$ ) little amount of  $\text{NO}_2$  are present in SL ( $0.17 \pm 0.25 \text{ mg L}^{-1}$ ), LL ( $0.3 \pm 0.16 \text{ mg L}^{-1}$ ), DL ( $0.16 \pm 0.05 \text{ mg L}^{-1}$ ), PL ( $0.14 \pm 0.05 \text{ mg L}^{-1}$ ) and CrL ( $0.3 \pm 0.08 \text{ mg L}^{-1}$ ) (Fig. 2B). However, significant amount of  $\text{NH}_4$  is present in all liquid wastes. The highest amount of  $\text{NH}_4$  present in DL ( $923.03 \pm 57.47 \text{ mg L}^{-1}$ ) followed by CrL ( $368.29 \pm 37.49 \text{ mg L}^{-1}$ ), PL ( $230.61 \pm 36.42 \text{ mg L}^{-1}$ ), LL ( $220.12 \pm 20.72 \text{ mg L}^{-1}$ ) and SL ( $141.14 \pm 8.22 \text{ mg L}^{-1}$ ) and the lowest amount of  $\text{NH}_4$  is present in FL ( $55.46 \pm 5.78 \text{ mg L}^{-1}$ ) (Fig. 2C).

From this study it is revealed that solid waste carry huge amount of nitrogen in different form. Additionally, the liquid waste carry considerable amount of  $\text{NH}_4$ . Though N is favoured for crop and fish yields as well as wetland macrophytes growth leads to increase of productivity and C sequestration but excess N, especially  $\text{NO}_3$  created threat for nitrate toxicity (Camago et al. 2005). Though, in EKW ecosystem the farmers are productively used both these wastes for agri-piscicultural practices for past eight decades. But, besides high yield agri-pisciculture production, the loss of N to the environment must be minimized by the optimization of nitrogen inputs through leather waste and prediction of accurate N requirements by the crop. However, exactitude N management with the use of organic solid waste containing numerous inorganic chemicals (Pal et al. 2018c), including N species, are an additional challenge. Because these solid waste which is used as organic fertilizer, usually not as well defined and predictable as the mineral fertilizers. Due to this reasons the standardization of requirements of mineral N fertiliser in fields with leather waste amendments might be very tough job today (Rutting et al., 2018). Because underestimation causing low productivity, whereas, overestimated leading to N losses to the environment. Moreover, excessive N deposition in wetland soil increase the rate of volatilization causes  $\text{NH}_3$  emission in one hand and on the other hand increase of nitrification and denitrification rate leading to  $\text{N}_2\text{O}$  emission and green house effect. Thus, at the very next extensive research work will be needed to standardised the different leather waste application in agri-piscicultural system of EKW area and explore the ultimate fate of these waste.

Fig. 1.A-D. Average  $\text{NO}_3$ ,  $\text{NO}_2$ ,  $\text{NH}_4$  and N content in RHS and four different solid waste of three different tanneries in CLC area.



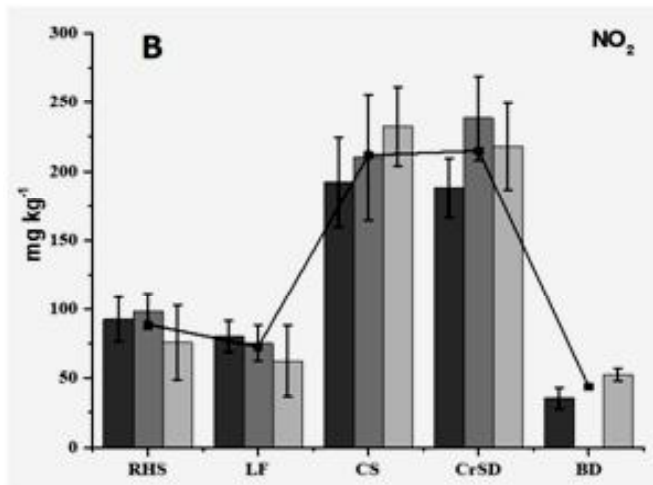
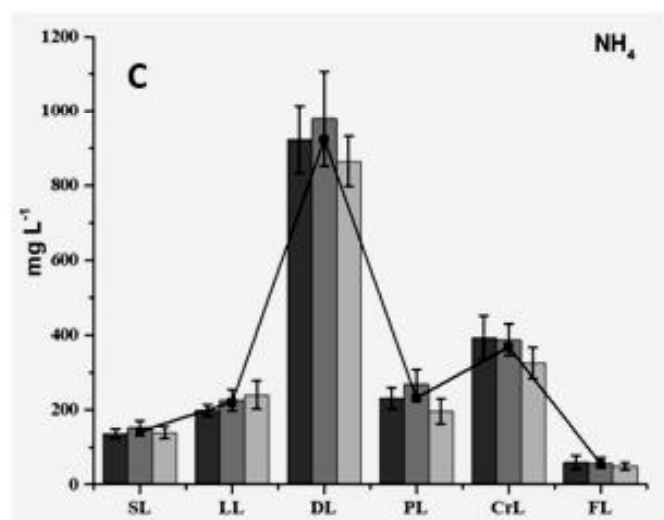
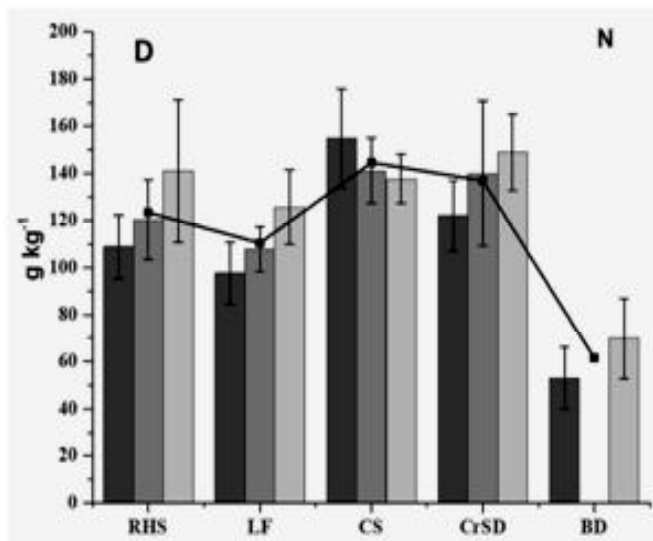
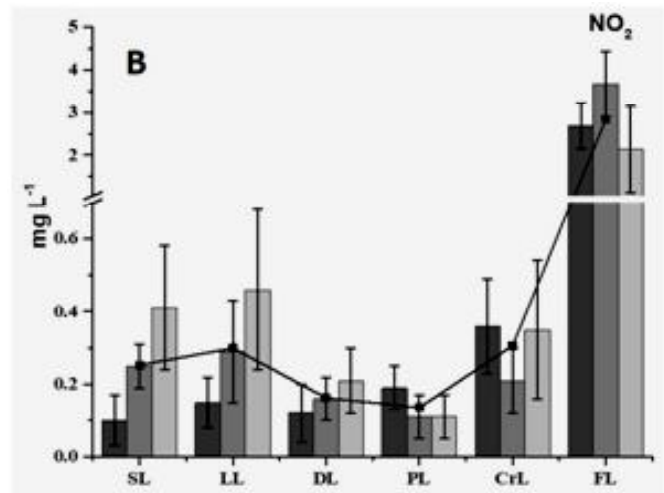
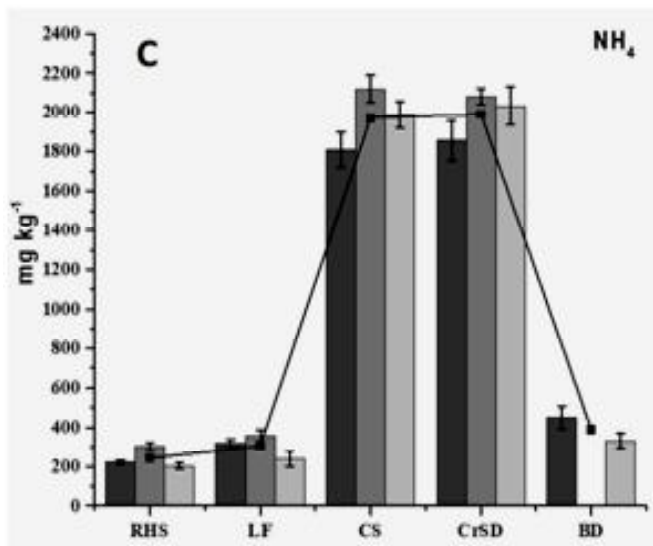
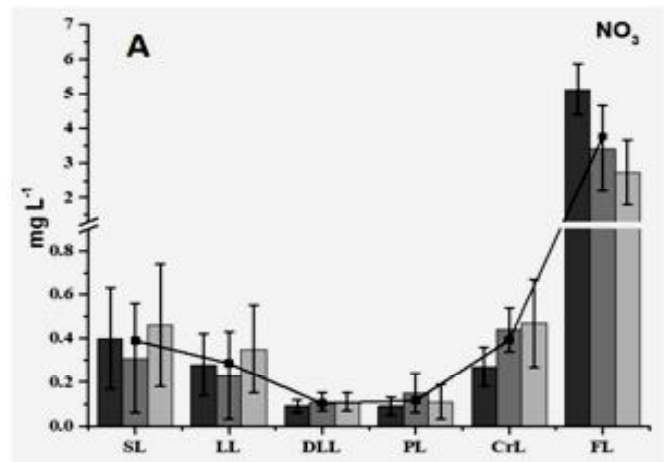


Fig. 2. A-C. Average NO<sub>3</sub>, NO<sub>2</sub> and NH<sub>4</sub> content in six liquid wastes of different tanneries in CLC area.





### Acknowledgement :

Authors are thankful to DHESTBT, Government of West Bengal for the sanctioned project (193 (sanc)/ST/P/S&T/2G-02/2017) under which the present research work is going on. Authors express their thanks to Dr. Goutam Mukherjee, Dr. Anjan Biswas and Mr. Sandip, Das, GCELT, Kolkata, for providing the laboratory facilities and necessary help.

### References :

- 1) Bunting, W.S., Pretty, J., Edwards, P., 2010. Wastewater-fed aquaculture in the East Kolkata Wetlands, India: anachronism or archetype for resilient ecocultures? *Rev. Aquacult.* 2, 138–153.
- 2) Camago JA, Alonso A, Salamanca A. 2005. Nitrate toxicity to aquatic animals: a review with new data for freshwater invertebrates. *Chemosphere* 58(9):1255–1267.
- 3) Chattopadhyay, B., Roy Goswami, A., Aich, A., Datta, S., Mukhopadhyay, S. K. 2011 Characterization of tannery solid waste based fertilizers and fish-food. *J. Solid Waste Tech. Manage.* 37(4): 253-259.
- 4) Eaton, A. D., Clesceri, L. S., Greenberg, A. E. 2005. Standard Methods of the Examination of Water and Wastewater, 21st edn. APHA, Washington D.C.
- 5) Ghosh, D., Sen, S., 1987. Ecological history of Calcutta's wetland conversion. *Environ. Conserv.* 17, 270–279.
- 6) Jackson, P. E. 2000. Chromatography in Environmental Analysis. In: *Encyclopedia of Analytical Chemistry* (eds. Meyers, R. A.), John Wiley & Sons Ltd., Chichester. pp. 2779–2801.
- 7) Ozgunay, H., Colak, S., Mutlu, M. M., Akyuz, F. 2007. Characterization of Leather Industry Wastes. *Polish J. Environ. Study.* 16(6): 867-873.
- 8) Pal S, Chakraborty S, Datta S, Mukhopadhyay SK. 2018b. Spatio-temporal variations in total carbon content in contaminated surface waters at East Kolkata Wetland Ecosystem, a Ramsar Site. *Ecol. Engg.*, 110: 146-157.
- 9) Pal S, Chattopadhyay B, Mukhopadhyay SK. 2015a. Assessment of Carbon Contribution to the East Kolkata Wetland Ecosystem (Ramsar Site: 1208) by different Leather Producing Units of Calcutta Leather Complex area, Part I. *J. Soc. Leather Technol. Chemists*, 99(1):1-7.
- 10) Pal S, Chattopadhyay B, Mukhopadhyay SK. 2015b. Assessment of Carbon Contribution to the East Kolkata Wetland Ecosystem (Ramsar Site: 1208) by different Leather Producing Units of Calcutta Leather Complex area, Part II. *J. Soc. Leather Technol. Chemists*, 99(2):70-79.
- 11) Pal S, Chattopadhyay B, Mukhopadhyay SK. 2016b. Spatio-temporal study of carbon sequestration through piscicultural practice at East Kolkata Wetland (A Ramsar Site), India. *J. Environ. Biol.*, 37(5): 965-971.
- 12) Pal S, Manna S, Chattopadhyay B, Mukhopadhyay SK. 2016a. Carbon sequestration and its relation with some soil properties of East Kolkata Wetlands (A Ramsar Site): A spatio-temporal study using radial basis functions. *J. Model. Earth Syst. Environ.* 2: 80. DOI 10.1007/s40808-016-0136-4.
- 13) Pal S, Mukhopadhyay SK. 2018a. An overview of carbon input and output from Calcutta Leather Complex. *J. Indian Leather Technol. Assoc.*, 68(2): 85-89.
- 14) Pal S, Chakraborty S, Chattopadhyay B, Datta S, Mukhopadhyay SK. 2018c. Leather Industries of Kolkata vis-à-vis Present Status of Cr<sup>3+</sup> and Cr<sup>6+</sup> Contents in Physical Environment of East Kolkata Wetlands. *J. Indian Leather Technol. Assoc.*, 68(10): 17-23.
- 15) Puntener A. 1995. The Ecological Challenge of Producing Leather. *J. Am. Leather Chem.* 90, 206-219.
- 16) Rajamani S. 2010. World Environmental Update in Leather Sector - Bio-Energy Generation from Tannery Effluent and Solid Wastes, *Leather News India*.
- 17) Rivela, B., Mendez, R., Bornhardt, C., Vidal, G. 2004. Towards a cleaner production in developing countries: a case study in a Chilean tannery. *Waste Manage. Res.*, 22: 131-141.
- 18) Rutting T, Aronsson H, Delin S. 2018. Efficient use of nitrogen in agriculture. *Nutr.Cycl.Agroecosyst.*, 110:1–5

## **SOLIDARIDAD STEPS TO MAKE THE LEATHER PRODUCTION SUSTAINABLE IN KANPUR-UNNAO LEATHER CLUSTER**

The city of Kanpur, India, on the banks of the holy river Ganges, hosts a lively tannery industry, employing 50,000 people directly and 250,000 indirectly. Leather processing, however, is one of the polluting industries due to the nature of the operations involved. It also consumes huge amount of water. The cluster consists of over 300 small, medium and large scale industries processing leather and leather goods.

Solidaridad is working on a project called, "Pollution prevention and efficient water use in Kanpur-Unnao leather cluster." This project aims to work with 100 tanning units in the region with a vision to attain reduction in:

- (a) The effluent discharged by the Kanpur-Unnao tanning sector by at least 40% in volume; and
- (b) The maximum allowable levels of key pollutants as per the existing Indian environmental law

The project will also work on the following aspects in the cluster:

- a. Introduction of best practices on cleaner production methods in 100 tanneries
- b. Pre-CETP (Common Effluent Treatment Plant) water and waste reduction demonstrations with cleaner technologies established at 20 tanneries
- c. Training of 2 technical staff per tannery on the best practices and cleaner technologies on efficient water management practices
- d. Develop a self- assessment tool for gap analysis based on the compliance parameters.
- e. Develop a multi stakeholder platform with the presence of all the relevant stakeholders (Government regulatory authorities ; District Administration, NMCG, CPCB, UPPCB, Industry Associations, GPCU, CLRI, CLE, Solidaridad/ consortia partners etc.) This platform will formally interact at least once in quarter to discuss the progress and challenges of the cluster.
- f. Establish a Centre of Excellence with the global technical expertise of Stahl demonstrating best practices/ cleaner technologies
- g. Regular interactions with Government regulatory authorities and service providers on waste water treatment (post CETP)

- h. Strengthening the downstream community by engaging women livelihood generation activities, providing training's on good agricultural practices and working on improved drinking water facilities.

This project was formally launched on 13 November 2017 by His Excellency the Ambassador of the Netherlands to India Mr. Alphonsus Stoelinga, in presence of the Principal Secretary, Ministry of Environment and Forest, Uttar Pradesh, Executive Director, National Mission for Clean Ganga and other dignitaries from around the world.

In this project, we have been able to evolve a consortium of National as well as International expertise with Solidaridad as the lead partner; Stahl, a leading chemical supplier to the global leather industry; PUM, a group of Netherlands based senior experts; Uttar Pradesh Leather Industry Association (UPLIA) and Small Tanners Association (STA) as industry representatives; Uttar Pradesh Jal Nigam and lastly Central Leather Research Institute as the technical partner of the project. In the project, Solidaridad with the key technical inputs of the consortium partners analyzed the value chain of leather processing and developed a matrix of meaningful interventions, which are being pilot tested in the field.

Since the inception, we have engaged with the industry and other important stakeholders in the cluster. We are also working on the implementation of water efficient technologies and processes such as (a) Pickle (salt) free tanning system; (b) low-sulfide, enzyme-assisted un-hairing coupled with reuse of liming wastewater; (c) waterless chrome tanning; (d) electro-oxidation of sectoral streams and reuse of treated wastewater; (e) installation of water meters on the drums to optimize the use of water and chemicals; and (f) upgradation of primary effluent treatment plants. We have also organized various workshops in the cluster on Occupational Health and Safety trainings particularly for sensitizing the workers for the use of first aid, PPE equipment and H2S gas safety; introduction to self-assessment tool; organized various consultations where the industry could interact with technical experts, government departments to discuss the challenges and way forwards.

Stahl has also developed a knowledge and training facility called the "Center of Excellence" in the cluster which is expected to be launched in May 2019. This is a state-of-the-art facility for tanners and workers of the cluster that provides leadership, best practices, research support and training to the industry.

Solidaridad has plans to upscale the successful pilot interventions and similarly plan such initiatives in the Kolkata and Bangladesh leather cluster. On these lines, we have already initiated our journey with in the Kolkata leather cluster.

..... X .....

### **CENTRE MULLS DUTY-FREE EXPORT OF RAW HIDES AS UP SHUTS TANNERIES FOR KUMBH**

With the UP government turning a deaf ear to the Centre's plea to not shut down tanneries in the state for three full months for the Kumbh Mela, the commerce Ministry is examining ways to ease the situation for the affected industries.

Top officials in the Ministry met meat and leather exporters on Tuesday to look at the option of allowing raw hides to be exported without export duties, at least during the ban period, to keep the meat industry running.

#### **Export duty waiver**

"The Centre will take a call on whether it is feasible to allow export of raw hides by removing the existing export duty, at least in the December-February period, when the tanneries are closed in UP, so that the meat industry will not face the impossible task of stocking raw hides or, worse still, disposing them of as rubbish," a government official told Business Line.

At present, export duty of 60 percent on raw hides makes exports impossible for the meat industry as it is not able to price their products competitively. Exporters of buffalo and sheep meat have been urging the government for long to do away with the export duty as there is a big market for hides globally. They say that it is imperative that orders are passed immediately, at least for the next three months.

#### **'Swift action needed'**

"Hides need to be processed within a week of de-hiding as after that they start putrefying. We sincerely request for urgent consideration and withdrawal of 60 percent export duty on raw hides for the survival of the meat export industry," said a representation made by the All India Meat and Livestock Exporters Association (AIMLEA). Representatives from both AIMLEA and the Council for Leather Exports participated in Tuesday's meeting.

Following the Yogi Adityanath government's orders, most tanneries in Kanpur and Unnao have shut down from December 15, hitting both the leather and the meat industries in the State. Some units, which are connected to the Loni drain that doesn't open up in the Ganga, are being allowed to function but at less than half their capacity and under numerous restrictions, said Fauzan Alavi from AIMLEA.

"It is very clear that the tanneries will not be able to process the raw hides that are the by-products of the meat industry. The government must facilitate their export," Alavi said. The Commerce Ministry, however, has not made up its mind on the matter yet and would take a decision in some days, the official said. The high export duty had been put in place to ensure that the leather industry, which is labour-intensive, gets its raw material at a cheap price and the Commerce Ministry needs to take a decision weighing all interests, he added.

#### **Industry turnover**

According to industry estimates the turnover of the leather industry in UP is about Rs.4,000 crore a month while meat exports is worth around Rs.600 crore.

The Commerce Ministry had suggested to the UP government that instead of a three month shutdown of tanneries, it should follow the past practice of closing the tanneries only three-four days at a time ahead of the days assigned for the holy bath and allow them to function on the other days.

(Source : Business Line, New Delhi – 19/12/2018)

### **LEATHER FIRMS ARGUE OVER SEMI-FINISHED PRODUCT EXPORT**

Leather garment and footwear manufacturers have asked the government not to treat semi-finished leather as finished product for export purpose as the move would impact availability of raw material, industry sources said. The demand has come against the backdrop of semi-finished or crust leather makers approaching the commerce ministry to permit export of the product as finished leather with a view to increasing shipments.

"Allowing this will impact domestic manufacturing and availability of raw material for leather garment and footwear makers. It will also hit the government's Make in India campaign," sources said. Investment and technology upgradation are required to make finished leather attracts 60 percent export duty, there is no duty for shipment of finished leather.

"Exporters of semi-finished goods also want to avoid the export duty. Treating semi-finished as finished for exports will severely affect domestic as well as export of shoes and leather products," the sources added.

(Source : Business Standard, New Delhi – 08/01/2019)



### PRABHU TO INAUGURATE IILF-2019 IN CHENNAI

The 34<sup>th</sup> edition of India International Leather Fair (IILF), one of the biggest leather events of India Trade Promotion Organization (ITPO), CLE and other apex leather bodies will be inaugurated by Union Minister of Commerce and Industry Suresh Prabhu on 31 January 2019 at Nandambakkam, Chennai (Tamil Nadu). An exclusive Theme Pavilion : 'Greening the Leather' as well as technical seminars will make the event more meaningful for the participants and delegates from India and abroad.

This year, apart from unveiling the export potential of India, IILF also aims to project India as an investment destination and manufacturing a hub for design and information. This year to the fair also manifests its commitment to various initiatives taken by the government such as 'Make in India', 'Digital India', 'Skill India', 'Swachh Bharat' and 'Start up India'.

IILF 2019 will feature a wide range of products, machinery and equipment from over 450 companies from India and abroad, while more than 150 exhibitors are taking part from overseas. Significantly, China, France, Germany, Italy and Brazil are setting up their National Pavilions.

(Source : Statesman, New Delhi – 15/01/2019)

### SHARE PRICE RALLY : THE WALK IS NOT YET OVER FOR BATA

GST cut, new launches, revamped products to fuel revenue growth

#### SHREEPAD SAUTE

A slash in the goods and services tax (GST) rate in July last year, besides a robust performance in the April-September 2018 (H1FY19), has helped Bata India stock gain about 24 percent since August. The stock has outperformed the BSE Fast Moving Consumer Goods Index, which fell over 2 percent during this period. However, the rally is not yet over for Bata. Some analysts foresee 12-13 further upside in the stock.

The gains will not only come from the GST cut but also from the company's efforts to add new and revamped products, which would aid overall top line growth. Report by Prabhudas Lilladher revealed the new and revamped portfolio was receiving good consumer response. Also, the company plans to open 90 new owned stores by the end of the ongoing financial year (of these, 45 stores already added during H1FY19).

Bata's net sales, that grew just around 6 percent in FY18, are expected to rise at a compound annual growth rate of over 12 percent from FY18 to FY21. All this (including lower GST) should also help protect its margin profile, emanating from a likely increase in the sale of premium products, despite expected investments for marketing and advertising of new launches, and additional cost of new store openings. According to a sharekhan report, from 30 percent during H1FY19, revenue contribution of premium products moved up to 32 percent currently, which is further likely to rise to 35 percent by the end of FY19.

Profitability would also get a boost out of lower inflation. Prices of rubber, one of the key inputs for Bata, have fallen 3 percent so far from September-end. Lower crude oil prices, and a curb in the weakening rupee against the dollar would lower its packaging and logistics costs. Thus, the performance in the first half of FY19, with net sales growth of 11 percent, margin improvement by 281 basis points, and net profit growth by 34 percent, is expected to continue in future quarters.

(Source : Business Standard, New Delhi – 08/01/2019)

### Indian Leather Industry - Overview, Export Performance and Prospects

- The Leather Industry holds a prominent place in the Indian economy. This sector is known for its consistency in high export earnings and it is among the top ten foreign exchange earners for the Country.
- The export of footwear, leather and leather products from India reached a value of US\$ 5.74 billion during 2017-18.
- The leather industry is bestowed with an affluence of raw materials as India is endowed with 20% of world cattle & buffalo and 11% of world goat & sheep population. Added to this are the strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and the dedicated support of the allied industries.
- The leather industry is an employment intensive sector, providing job to about 4.42 million people, mostly from the weaker sections of the society. Women employment is predominant in leather products sector with about 30% share.
- India is the second largest producer of footwear and leather garments in the world.
- India is the second largest exporter of leather garments and third largest exporter of Saddlery & Harness in the world.
- The major production centers for footwear, leather and leather products in India are located in the States of Tamil Nadu - Chennai, Ambur, Ranipet, Vaniyambadi, Vellore, Pernambut, Trichy, Dindiguland – Erode ; West Bengal - Kolkata; Uttar Pradesh - Kanpur, Agra, Noida, Saharanpur ; Maharashtra - Mumbai ; Punjab - Jalandhar ; Karnataka -



ILTA  
Since 1950

Bengaluru ; Telengana - Hyderabad ; Haryana - Ambala, Gurgaon, Panchkula, Karnal and Faridabad; Delhi; Madhya Pradesh - Dewas; Kerala - Kozhikode and Ernakulam / Cochin ; Rajasthan ; Jaipur ; Jammu & Kashmir ; Srinagar.

**Strengths Of Indian Leather Sector :**

- Own raw material source – About 3 billion sq.ft of leather produced annually
- Some varieties of goat/calf/sheep skins command premium position
- Strong and eco-sustainable tanning base
- Modernized manufacturing units
- Trained/skilled manpower at competitive wage levels
- World-class institutional support for Design & Product Development, HRD and R & D.
- Presence in major markets – Long Europe experience
- Strategic location in the Asian landmass

**Emerging Strengths :**

- Design development initiatives by institution and individuals
- Continuous modernization and technology upgradation
- Economic size of manufacturing units
- Constant human resource development programme to enhance productivity
- Increasing use of quality components
- Shorter prototype development time
- Delivery compliance
- Growing domestic market for footwear and leather articles

**Highlights Of Leather Product Segments :**

- **Tanning Sector** – Annual production about 3 billion sq.ft. Accounts for 10% of world leather requirement. Indian colors continuously being selected at the MODEUROPE Congress
- **Footwear Sector** – Second largest footwear producer after China. Annual Production 2257 million pairs. Huge domestic retail market; 2021 million pairs are sold in domestic market. Footwear (leather and non-leather) export accounts for about 43.5% share in India’s total leather & leather products export. The Footwear products mix; Gents 58%, Ladies 30% ,Children 9% and others 3%
- **Leather Garments Sector** – Second largest producer and second largest global exporter. Accounts for 9% share of India’s total export from leather sector.
- **Leather Goods & Accessories Sector including Saddlery & Harness** - Fifth largest global exporter. Accounts for about 24% share of India’s total export.

**India’s Export of Leather and Leather Products For Five Years**

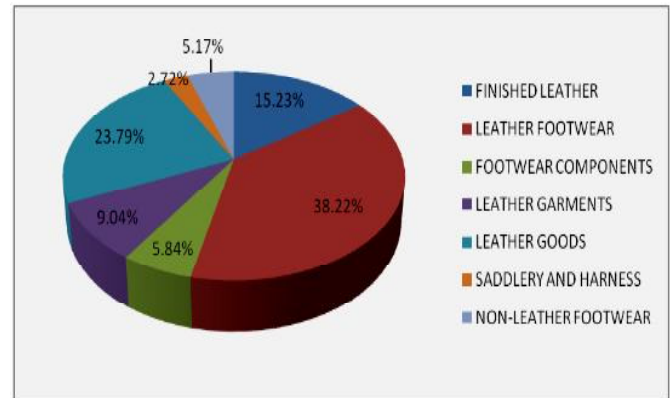
| Product            | 2013-14        | 2014-15        | 2015-16        | 2016-17        | 2017-18        |
|--------------------|----------------|----------------|----------------|----------------|----------------|
| Finished Leather   | 1284.71        | 1329.05        | 1046.45        | 886.39         | 874.23         |
| Footwear           | 2557.66        | 2945.58        | 2739.06        | 2765.77        | 2825.53        |
| Leather Garments   | 596.15         | 604.25         | 553.11         | 535.66         | 518.96         |
| Leather Goods      | 1353.91        | 1453.26        | 1370.04        | 1316.63        | 1365.33        |
| Saddlery & Harness | 145.54         | 162.7          | 146.38         | 142.35         | 155.88         |
| <b>Total</b>       | <b>5937.97</b> | <b>6494.84</b> | <b>5855.06</b> | <b>5646.79</b> | <b>5739.93</b> |
| <b>% Growth</b>    | <b>18.39%</b>  | <b>9.37%</b>   | <b>-9.84%</b>  | <b>-3.56%</b>  | <b>1.65%</b>   |

Source : DGCI & S

**Major Markets :**

1. The major markets for Indian Leather & Leather Products are USA with a share of 14.76%, Germany 11.92%, UK 10.74%, Italy 6.78%, France 5.69% Spain 4.90%, Hong Kong 4.32%, Netherlands 3.43%, China 2.97%, UAE 2.81%, Poland 2.52%, and Belgium 2.00%.
2. These 12 countries together accounts for nearly 73% of India’s total leather & leather products export

**% Share of Leather & Leather Products (2017-18)**



**European Union Accounts for 54.49% of India’s Total Export of Leather and Leather Products**

**India’s Export of Leather & Leather Products to Different Countries - 5 years**

| COUNTRY     | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | % Share of 2017-18 |
|-------------|---------|---------|---------|---------|---------|--------------------|
| USA         | 680.22  | 768.06  | 834.1   | 867.19  | 847.3   | 14.76%             |
| Germany     | 765.56  | 800.2   | 674.19  | 657.37  | 684.41  | 11.92%             |
| UK          | 664.92  | 751.33  | 716.49  | 606.18  | 616.41  | 10.74%             |
| Italy       | 518.04  | 504.26  | 407.91  | 374.09  | 389.06  | 6.78%              |
| France      | 354.72  | 371.75  | 308.45  | 287.74  | 326.38  | 5.69%              |
| Spain       | 308.07  | 351.27  | 327.86  | 293.43  | 281.3   | 4.90%              |
| Hong Kong   | 471.61  | 422.11  | 315.26  | 265.6   | 248.07  | 4.32%              |
| Netherlands | 218.55  | 224.92  | 182.97  | 169     | 196.98  | 3.43%              |
| China       | 153.63  | 194.26  | 162.21  | 173.72  | 170.34  | 2.97%              |
| U.A.E.      | 180.54  | 281.07  | 263.15  | 226.72  | 161.27  | 2.81%              |

| COUNTRY        | 2013-14        | 2014-15        | 2015-16        | 2016-17        | 2017-18        | % Share of 2017-18 |
|----------------|----------------|----------------|----------------|----------------|----------------|--------------------|
| Poland         | 69.18          | 81.74          | 65.2           | 101.06         | 144.47         | 2.52%              |
| Belgium        | 95.73          | 108.88         | 84.84          | 104.9          | 114.8          | 2.00%              |
| Vietnam        | 86.2           | 115.57         | 105.54         | 92.38          | 104.81         | 1.83%              |
| Australia      | 78.73          | 84.66          | 84.71          | 82.66          | 91.16          | 1.59%              |
| Japan          | 48.76          | 56.21          | 59.24          | 63.87          | 71.42          | 1.24%              |
| Denmark        | 89.38          | 83.9           | 76.17          | 77.22          | 69.35          | 1.21%              |
| Portugal       | 51.84          | 68.39          | 62.13          | 67.61          | 68.62          | 1.20%              |
| Korea Rep.     | 58.3           | 68.47          | 82.38          | 68.65          | 67.22          | 1.17%              |
| Russia         | 51.58          | 49.96          | 49.01          | 51.15          | 56.08          | 0.98%              |
| Canada         | 51.66          | 59.24          | 47.25          | 46.94          | 50.5           | 0.88%              |
| Austria        | 40.06          | 35.48          | 26.2           | 27.86          | 46.26          | 0.81%              |
| South Africa   | 48.16          | 55.04          | 52.87          | 44.13          | 43.8           | 0.76%              |
| Sweden         | 50.62          | 46.48          | 38.14          | 40.83          | 43.2           | 0.75%              |
| Saudi Arabia   | 38.67          | 47.42          | 36.77          | 40.86          | 37.87          | 0.66%              |
| Indonesia      | 27.22          | 28.95          | 25.62          | 26.97          | 33.82          | 0.59%              |
| Switzerland    | 32.82          | 37.05          | 29.74          | 24.83          | 30.37          | 0.53%              |
| Singapore      | 19.78          | 22.12          | 23.49          | 33.04          | 14.42          | 0.25%              |
| Greece         | 12.01          | 14.22          | 10.95          | 10.16          | 10.28          | 0.18%              |
| New Zealand    | 9.66           | 12.11          | 11.23          | 9.81           | 9.88           | 0.17%              |
| Somalia        | —              | —              | 100.12         | 94.12          | 58.82          | 1.02%              |
| Chile          | 47.63          | 53.12          | 52.18          | 41.85          | 44.9           | 0.78%              |
| Malaysia       | 62.4           | 62.99          | 54.58          | 48.6           | 48.77          | 0.85%              |
| Slovak rep     | —              | —              | 30.71          | 31.48          | 36.44          | 0.63%              |
| Turkey         | 46.73          | 39.63          | 27.6           | 19.96          | 22.63          | 0.39%              |
| Hungary        | 32.2           | 30.96          | 23.46          | 28.23          | 24.65          | 0.43%              |
| Sudan          | 23.65          | 31.4           | 20.17          | 14.63          | 8.86           | 0.15%              |
| Nigeria        | 11.45          | 12.3           | 17.02          | 20.29          | 24.75          | 0.43%              |
| Bangladesh     | 14.07          | 18.08          | 17.66          | 34.98          | 27.59          | 0.48%              |
| Thailand       | 29.87          | 28.79          | 18.22          | 19.82          | 19.82          | 0.35%              |
| Finland        | 27.19          | 23.55          | 16.8           | 17.25          | 19.76          | 0.34%              |
| Kenya          | 6.75           | 8.26           | 12.73          | 30.25          | 22.04          | 0.38%              |
| Djibouti       | —              | —              | 14.79          | 11.19          | 8.56           | 0.15%              |
| Mexico         | 9.84           | 8.57           | 12.49          | 12.14          | 19.36          | 0.34%              |
| Norway         | 15.86          | 15             | 12.31          | 7.54           | 8.76           | 0.15%              |
| Israel         | 11.93          | 13.91          | 13.35          | 13.09          | 15.78          | 0.27%              |
| Oman           | 24.39          | 11.21          | 12.76          | 12.29          | 9.32           | 0.16%              |
| Sri Lanka des  | 11.36          | 10.13          | 13.85          | 14.42          | 12.34          | 0.22%              |
| Cambodia       | 7.08           | 10.81          | 12.62          | 10.4           | 7.24           | 0.13%              |
| Czech republic | 19.84          | 22.53          | 10.45          | 9.33           | 11.91          | 0.21%              |
| Taiwan         | 7.97           | 12.08          | 9.87           | 8.97           | 8.07           | 0.14%              |
| Others         | 251.54         | 336.4          | 187.24         | 209.98         | 249.4          | 0.39%              |
| <b>Total</b>   | <b>5937.97</b> | <b>6494.84</b> | <b>5855.06</b> | <b>5646.79</b> | <b>5739.93</b> | <b>100.00%</b>     |

Source: ILTA Membership Records

## Future Outlook :

The Government of India had identified the Leather Sector as a Focus Sector under 'Make in India' programme keeping in view of its immense potential for growth and employment generation. Accordingly, the Government is also implementing various Special Focus Initiatives under the Foreign Trade Policy for the growth of leather sector. With the implementation of various industrial developmental programmes as well as export promotional activities; and keeping in view the past performance,

and industry's inherent strengths of skilled manpower, innovative technology, increasing industry compliance to international environmental standards, and dedicated support of the allied industries, the Indian leather industry aims to augment the production, thereby enhance export, and resultantly create additional employment opportunities.

## Analysis- Export Performance of Leather and Leather Products During April-March 2017-18 Vis - A - Vis April-March 2016-17

### A. Introduction :

As per officially notified DGCI & S monthly export data, the export of Leather and Leather products for the period April- March 2017-18 touched US\$ 5739.93 mn as against the performance of US\$ 5646.79 mn in April- March 2016-17, recording a positive growth 1.65%. In rupee terms, the export touched Rs.369966.47 mn in April- March 2017-18 as against Rs.378741.83 mn in April-March 2016-17, registering a decline of -2.32%.

### B. Product Wise Analysis

#### EXPORT OF LEATHER AND LEATHER PRODUCTS FROM INDIA DURING APRIL - MAR 2017-18 VIS-À-VIS APRIL - MAR 2016-17

| CATEGORY         | (Value In Million Rs) |                  |               |
|------------------|-----------------------|------------------|---------------|
|                  | APR-MAR 2016-17       | APR-MAR 2017-18  | % VARIATION   |
| FINISHED LEATHER | 59451.99              | 56348.35         | -5.22%        |
| LEATHER          | 142787.54             | 141388.63        | -0.98%        |
| FOOTWEAR         | 20033.83              | 21608.01         | 7.86%         |
| LEATHER          | 35927.98              | 33449.31         | -6.90%        |
| LEATHER GOODS    | 88308.72              | 88002.5          | -0.35%        |
| SADDLERY AND     | 9547.54               | 10047.3          | 5.23%         |
| NON-LEATHER      | 22684.23              | 19122.37         | -15.70%       |
| <b>TOTAL</b>     | <b>378741.83</b>      | <b>369966.47</b> | <b>-2.32%</b> |

Source : DGCI & S

| CATEGORY             | (Value In Million US\$) |                 |              |                |
|----------------------|-------------------------|-----------------|--------------|----------------|
|                      | APR-MAR 2016-17         | APR-MAR 2017-18 | % VARIATION  | % Share        |
| FINISHED LEATHER     | 886.39                  | 874.23          | -1.37%       | 15.23%         |
| LEATHER FOOTWEAR     | 2128.87                 | 2193.61         | 3.04%        | 38.22%         |
| FOOTWEAR COMPONENTS  | 298.69                  | 335.24          | 12.24%       | 5.84%          |
| LEATHER GARMENTS     | 535.66                  | 518.96          | -3.12%       | 9.04%          |
| LEATHER GOODS        | 1316.63                 | 1365.33         | 3.70%        | 23.79%         |
| SADDLERY AND HARNESS | 142.35                  | 155.88          | 9.51%        | 2.72%          |
| NON-LEATHER FOOTWEAR | 338.21                  | 296.68          | -12.28%      | 5.17%          |
| <b>TOTAL</b>         | <b>5646.79</b>          | <b>5739.93</b>  | <b>1.65%</b> | <b>100.00%</b> |

Source : DGCI & S



- Footwear holds the major share of 49.23% in the total export of leather and leather products
- Except finished leather, leather garments and non leather footwear other product categories have shown positive growth.

### C. Country-Wise Analysis

Statement showing Export of Leather & Leather Products to different countries during April-Mar 2017-18 vis-à-vis April-Mar 2016-17 is given below :

| COUNTRY      | (Value In Million US\$) |         |          |                       |
|--------------|-------------------------|---------|----------|-----------------------|
|              | TOTAL                   |         | % Change | Share in Total Export |
|              | APR-MAR                 | APR-MAR |          |                       |
|              | 2016-17                 | 2017-18 | 2017-18  | 2017-18               |
| GERMANY      | 657.37                  | 684.41  | 4.11%    | 11.92%                |
| U.S.A.       | 867.19                  | 847.3   | -2.29%   | 14.76%                |
| U.K.         | 606.18                  | 616.41  | 1.69%    | 10.74%                |
| ITALY        | 374.09                  | 389.06  | 4.00%    | 6.78%                 |
| FRANCE       | 287.74                  | 326.38  | 13.43%   | 5.69%                 |
| HONG KONG    | 265.6                   | 248.07  | -6.60%   | 4.32%                 |
| SPAIN        | 293.43                  | 281.3   | -4.14%   | 4.90%                 |
| RUSSIA       | 51.15                   | 56.08   | 9.64%    | 0.98%                 |
| NETHERLANDS  | 169                     | 196.98  | 16.56%   | 3.43%                 |
| AUSTRALIA    | 82.66                   | 91.16   | 10.28%   | 1.59%                 |
| NEW ZEALAND  | 9.81                    | 9.88    | 0.70%    | 0.17%                 |
| DENMARK      | 77.22                   | 69.35   | -10.19%  | 1.21%                 |
| GREECE       | 10.16                   | 10.28   | 1.21%    | 0.18%                 |
| CANADA       | 46.94                   | 50.5    | 7.58%    | 0.88%                 |
| SWITZERLAND  | 24.83                   | 30.37   | 22.29%   | 0.53%                 |
| SWEDEN       | 40.83                   | 43.2    | 5.78%    | 0.75%                 |
| S. AFRICA    | 44.13                   | 43.8    | -0.74%   | 0.76%                 |
| AUSTRIA      | 27.86                   | 46.26   | 66.02%   | 0.81%                 |
| BELGIUM      | 104.9                   | 114.8   | 9.44%    | 2.00%                 |
| JAPAN        | 63.87                   | 71.42   | 11.83%   | 1.24%                 |
| PORTUGAL     | 67.61                   | 68.62   | 1.49%    | 1.20%                 |
| CHINA        | 173.72                  | 170.34  | -1.95%   | 2.97%                 |
| SINGAPORE    | 33.04                   | 14.42   | -56.35%  | 0.25%                 |
| U.A.E.       | 226.72                  | 161.27  | -28.87%  | 2.81%                 |
| INDONESIA    | 26.97                   | 33.82   | 25.40%   | 0.59%                 |
| KOREA REP.   | 68.65                   | 67.22   | -2.08%   | 1.17%                 |
| VIETNAM      | 92.38                   | 104.81  | 13.45%   | 1.83%                 |
| SAUDI ARABIA | 40.86                   | 37.87   | -7.33%   | 0.66%                 |
| SOMALIA      | 94.12                   | 58.82   | -37.51%  | 1.02%                 |
| POLAND       | 101.06                  | 144.47  | 42.95%   | 2.52%                 |
| CHILE        | 41.85                   | 44.9    | 7.29%    | 0.78%                 |
| MALAYSIA     | 48.6                    | 48.77   | 0.35%    | 0.85%                 |
| SLOVAK REP.  | 31.48                   | 36.44   | 15.78%   | 0.63%                 |
| TURKEY       | 19.96                   | 22.63   | 13.39%   | 0.39%                 |
| HUNGARY      | 28.23                   | 24.65   | -12.65%  | 0.43%                 |
| SUDAN        | 14.63                   | 8.86    | -39.46%  | 0.15%                 |
| NIGERIA      | 20.29                   | 24.75   | 22.00%   | 0.43%                 |
| BANGLADESH   | 34.98                   | 27.59   | -21.11%  | 0.48%                 |
| THAILAND     | 19.82                   | 19.82   | 0.03%    | 0.35%                 |
| FINLAND      | 17.25                   | 19.76   | 14.51%   | 0.34%                 |
| KENYA        | 30.25                   | 22.04   | -27.15%  | 0.38%                 |
| DJIBOUTI     | 11.19                   | 8.56    | -23.46%  | 0.15%                 |
| MEXICO       | 12.14                   | 19.36   | 59.46%   | 0.34%                 |
| NORWAY       | 7.54                    | 8.76    | 16.12%   | 0.15%                 |

| COUNTRY        | (Value In Million US\$) |                |              |                       |
|----------------|-------------------------|----------------|--------------|-----------------------|
|                | TOTAL                   |                | % Change     | Share in Total Export |
|                | APR-MAR                 | APR-MAR        |              |                       |
|                | 2016-17                 | 2017-18        | 2017-18      | 2017-18               |
| ISRAEL         | 13.09                   | 15.78          | 20.60%       | 0.27%                 |
| OMAN           | 12.29                   | 9.32           | -24.22%      | 0.16%                 |
| SRI LANKA DES  | 14.42                   | 12.34          | -14.44%      | 0.22%                 |
| CAMBODIA       | 10.4                    | 7.24           | -30.42%      | 0.13%                 |
| CZECH REPUBLIC | 9.33                    | 11.91          | 27.71%       | 0.21%                 |
| TAIWAN         | 8.97                    | 8.07           | -9.99%       | 0.14%                 |
| OTHERS         | 209.98                  | 249.4          | 18.77%       | 4.34%                 |
| <b>TOTAL</b>   | <b>5646.79</b>          | <b>5739.93</b> | <b>1.65%</b> | <b>100.00%</b>        |

### D. Major Export Destinations of India – Apr-Mar 2017-18

(Value in Million US\$)

|                    |               |
|--------------------|---------------|
| <b>U.S.A.</b>      | <b>847.3</b>  |
| <b>GERMANY</b>     | <b>684.41</b> |
| <b>U.K.</b>        | <b>616.41</b> |
| <b>ITALY</b>       | <b>389.06</b> |
| <b>FRANCE</b>      | <b>326.38</b> |
| <b>SPAIN</b>       | <b>281.3</b>  |
| <b>HONG KONG</b>   | <b>248.07</b> |
| <b>NETHERLANDS</b> | <b>196.98</b> |
| <b>CHINA</b>       | <b>170.34</b> |
| <b>U.A.E.</b>      | <b>161.27</b> |
| <b>POLAND</b>      | <b>144.47</b> |
| <b>BELGIUM</b>     | <b>114.8</b>  |

1. The major markets for Indian Leather & Leather Products are USA with a share of 14.76%, Germany 11.92%, UK 10.74%, Italy 6.78%, France 5.69%, Spain 4.90%, Hong Kong 4.32%, Netherlands 3.43%, China 3.09%, U.A.E. 2.81%, Poland 2.52% and Belgium 2.00%.
2. These 12 countries together accounts for nearly 72.84% of India's total leather & leather products export.
3. Export of leather & leather products to major markets like USA, Spain, Hong Kong, China, UAE etc. have shown negative growth during April-March 2017-18.

### E. Conclusion :

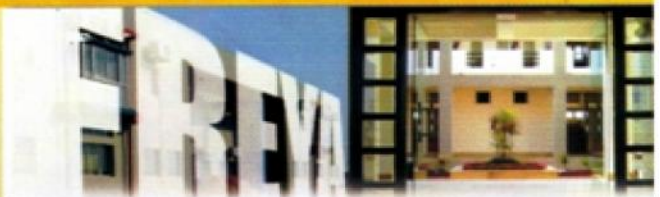
- 1) India's export of Leather and Leather products for the financial year April-March 2017-18 touched US\$ 5739.93 mn as against the performance of US\$ 5646.79 mn in the corresponding period of last year, recording a positive growth of 1.65%.
- 2) Export of different categories of Footwear holds a major share of about 49.23% in India's total leather & leather products exports with an export value of US\$ 2825.53 mn. This is followed by Leather Goods & Accessories with a share of 23.79%, Finished Leather 15.23%, Leather Garments 9.04% and Saddlery & Harness 2.72%.
- 3) Except Finished Leather, Leather Garments and non leather footwear other product categories have shown positive growth.

## INDIAN LEATHER PRODUCTS ASSOCIATION

The Indian Leather Products Association (ILPA), established in 1987, is a premiere representative body of manufacturer-exporters of superior quality leather and leather products with head office in Kolkata and a regional office in Chennai.

### IMPORTANT ACTIVITIES OF ILPA :

- Brings together manufacturer & merchant exporters on a common platform.
- Stimulates growth & development of the industry as a whole.
- Promotes export of leather & leather products.
- Develops & maintains symbiotic liaison with international trade bodies & Chambers of Commerce.
- Organises trade delegations to international fairs & seminars.
- Organises various Seminars/workshops both the benefit of its members and industry.
- Promotes International Fairs and RBSMs like IILF Kolkata, ILPA Buyer Seller Summit.
- Organises the ILPA SHOW : Leather on the Ramp , one of the most prestigious and sought after Fashion event in Eastern India.
- Closely involved in setting up the Calcutta Leather Complex(CLC).
- Runs and manages the Freya Design Studio : a CLE award winning Design Studio both for leather goods and footwear.
- Runs and manages the ILPA INFRASTRUCTURE DEVELOPMENT FOUNDATION (IIDF) – a state of the art Common Facility Centre.
- Imparts Skill Development Training through ILPA Technical School.



Common Facility Center



Design Studio



CAD CAM Center



ILPA Technical School



**Indian Leather Products Association**  
Plot no 1647, Zone 9, Calcutta Leather Complex,  
Karaidanga, West Bengal, Pin Code: 743502  
Mobile: +91 7605855567 / +91 9007881474  
E-Mail : mail@ilpaIndia.org  
Web: www.ilpaIndia.org



ILTA  
Since 1950

Come and visit  
the world's best  
leather goods  
sourcing platform  
in India

**ILPA  
BSS**  
BUYER SELLER SUMMIT 2019  
KOLKATA

28th & 29th January 2019  
in a centrally located  
world class luxury hotel – ITC Sonar.

**Reasons to visit:**

- 42 major leather goods companies displaying their latest & best quality International collections under one roof!
- This part of India is the world's most competitively priced leather goods production hub!
- Golden chance to source premium best priced leather goods at one go!

**Special Offers for Visitors:**

- Facility to stay in the same hotel at discounted rate if confirmed before 30th September 2018
- Pick up & Drop facility from Airport
- Complimentary Language interpretation service
- Complimentary lunch & refreshments
- Option for factory visit of participant companies

**Products on Display:**

Ladies Hand Bags, & Purses, Men's Bag & Wallets, Belts, Hand Gloves (Fashion & Industrial), Garments, Luggage & Hold alls, Portfolio, laptop bags, IPod Covers, small leather goods & Accessories



**BSS**  
**ILPA BUYER SELLER SUMMIT  
KOLKATA**  
28th & 29th January 2019

A highly focused B2B event  
featuring leather goods  
that brings together international  
Buyers & Sellers.

Indian Leather Products Association  
[www.ilpaIndia.org](http://www.ilpaIndia.org)

**BSS** Indian Leather Products Association  
BUYER SELLER SUMMIT 2019. KOLKATA

# 3D Printing cum Laser cutting and Engraving in Footwear Industry

<sup>1</sup>Arjun Verma, <sup>2</sup>Devendra Kumar Chaturvedi, <sup>3</sup>Hardik Chadda,

<sup>1,3</sup>Lecturer, Dept. of Footwear Technology, <sup>2</sup>Professor and Head, Dept. of Footwear Technology Faculty of Engineering, Dayalbagh Educational Institute, Dayalbagh, Agra

## Abstract

Rapid prototyping and Desktop fabrication machines have gained a lot of attention and popularity in the era of 4.0.

Here an attempt is to make the technology affordable and reachable to the masses, in this paper a machine is designed which provides both- the advantages of a 3D printer/Use of Laser cutting and Engraving. The uniqueness of this machine is that it has the ability to use the same platform and other parts of the machine except its head, which is to be replaced for 3D-printing and laser cutting or engraving for footwear industry.

**Key Words** - Prototype, Fabrication, Diode, 3D-printing, FDM, Absorption, and Emission

## Introduction

In the history of manufacturing, subtractive methods have come first and still the same method is used in present time [1]. In this, the exact shapes with high precision was generally a matter of subtractive manufacturing from filing and turning through milling and grinding process. Due to the recent developments in science and technology, the modern manufacturing industry is greatly affected. The Rapid Prototyping (RP) is one of the latest additive variants and its mission is to reduce the lead time and cost of developing prototypes for new parts and devices which was earlier done with subtractive tool room methods [2]. This printing technique helps to make shoe last and heels in a very effective manner. As a result of which, a lot of material can be saved unlike to subtractive methods as in case of CNC machine.

The concept of laser was discovered in 1960. It uses a large amount of energy generated by a laser to concentrated on a very small area in order to cut or engrave material effectively.

In the very beginning in Footwear industry, layout of patterns on the skin with white pen or with pencil and then cut the components with the help of scissor. This could easily enable the worker for making alternative interlocking arrangement. Then, clicking of upper components with the help of clicking knife using tin templates, but it is a time-consuming process and not so accurate. It is difficult to cut thick leather like buff leather with clicking knife or scissor. Therefore, the clicking machine came into existence. To click different components of leather the clicking dies are used on the heavy-duty mechanical clicking press. To enhance the clicking accuracy different clicking pressures are need, which motivated to make hydraulic machines in which the pressure and time can be controlled. There are a few demerits of these clickers that we need different clicking dies of different shapes and sizes for different components of footwear. As a result, huge investment of money is required [3]. To overcome this problem, the concept of laser is introduced to cut components as well as to engrave easily in a very effective way. Only a computer aided design (CAD) file is required and rest of the work is done by the machine. So, no dies and other stuff are required for cutting and engraving.

## Laser cutting and Engraving

In recent years, Leather cutting by LASER (Light Amplification by Stimulated Emission of Radiation) machine has become popular among many industries.

Laser cutting machines utilize digital and automatic technology to hollow out, engrave, & cut in the product effectively [4]. The laser cutting machine has broken the limits of traditional manual and electric cutting like hydraulic swing arm and Rotating head with their slow speed and pattern layout difficulty. The CO<sub>2</sub>/ Diode/ Fibre laser fully solves the problem of unreachable efficiency and wastage of materials.

\* Corresponding author E-mail : dkc.foe@gmail.com

The speed as well as accuracy of laser cutting is high and the operation is simple which involves giving the graphics and piece size to the computer which enables the machine to cut out the finished product in a non-contact manner.

### Working of Laser cutting

The laser beam in the leather cutting machine, the energy is focused into a small spot so that the focal point achieves a high-power density which quickly turns the photon energy into heat to form holes. As it moves on the material, the hole produces a small cutting seam continuously. So, there is no workpiece deformation [5].

There are basically three phenomena by which an atom can emit light energy and that are **Absorption**, **Spontaneous Emission** and **Stimulated emission**[6].

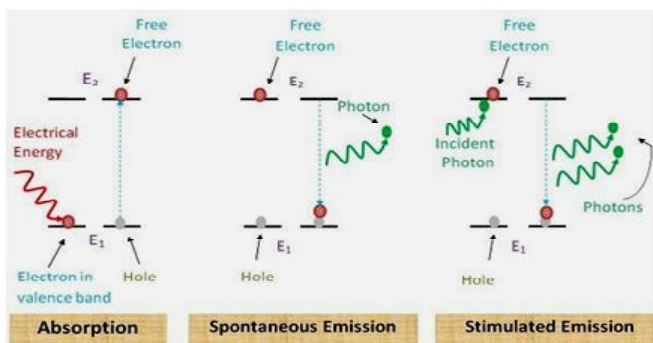


Fig.1 Principle of Laser Action [7]

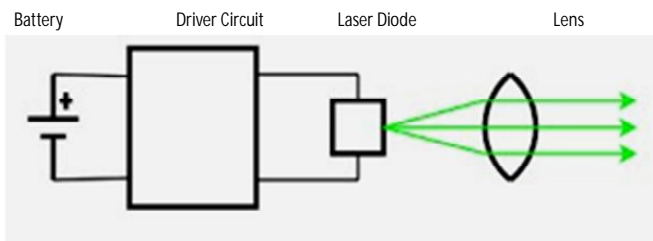


Fig.2 Schematic diagram of Laser diode working [8]

### 3D Printing

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. In this layer by layer the object is created without wasting of material [9].

### Working of 3D-printing

It all starts with making a virtual design of the object you want to create [10]. This virtual design is made in a CAD (Computer

Aided Design) file using a 3D software (for the creation of a totally new object) or with the use of a 3D scanner (to replicate an existing object). This scanner makes a 3D digital copy of an object and puts it into a 3D modeling program.

When the file is ready, the software slices the final model into hundreds or thousands of horizontal layers. When it loads into the printer, the printer makes the object layer by layer [11].

### FDM (Fused Deposition Modeling) [12]

- i. A spool of filament is attached into the printer. Then, we set the required temperature for printing the object. After reaching to the desired temperature, the filament is attached to the extrusion head via nozzle where it melts.
- ii. The extrusion head is attached in such a way that it freely moves in all the three directions i.e. X, Y, & Z. The material is melted continuously and it is deposited layer-by-layer in the pre-set locations from where it cools and solidifies. Sometimes we can accelerate the cooling of the material through cooling fans that are attached on the extrusion head.
- iii. To fill an area, multiple drives are required. When a particular layer is finished, the build platform moves downward and a new layer is deposited. This process is repeated until the part is complete. When the part (prototype) is completed, we remove the support material and the part is finished.

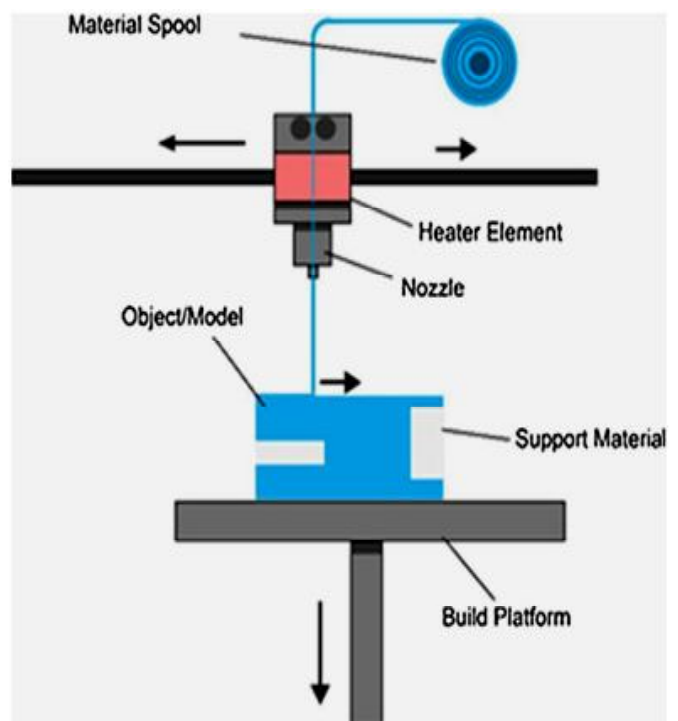


Fig.3 FDM printing process [13]



### Materials for laser cutting and 3D printing

Natural leather, Synthetic leather, semi-finished products, variety of leather fabrics, wood, cardboard, paper etc. are used for cutting and engraving while the materials in the below table is used to make prototypes via 3D printer.

| Current Materials               | Future Materials               |
|---------------------------------|--------------------------------|
| Wood, PVC for making prototypes | PLA, ABS for making prototypes |

### Applications of 3D printing, laser cutting and engraving in Footwear Industry

3D printer allows printing of shoe last (Prototype), shoe heels etc. while laser cutting allows to cut and engrave leather depending on the thickness of leather and cloth for manufacturing of the shoe.

Automation of the process makes it easy and convenient for the labours to accurately cut and print parts of the shoe industry.

### Advantages over other conventional methods

- One machine serves two different aspects.
- Only a design file is required and rest of the work is done by the machine.
- Perfect solution for personalised and customised fabrication.
- Lead time for production is very less.
- Cheap cost
- Easy to use
- Easy to lift and install anywhere.
- Serves to several industries.
- Simple maintenance
- No mechanical pressure on the work piece.
- It saves material too much because of additive manufacturing.

### Some product samples of proposed machine



Fig.4 3D Printed Shoe last (Prototype)



Fig.5 Engraved D.E.I (Dayalbagh Educational Institute) logo on leather



Fig.6 Making D.E.I (Dayalbagh Educational Institute) stamp on wood



Fig.7 3D Printed dice



### Conclusion

This bi-functional machine serves Footwear industry in making prototypes as well as for cutting and engraving purposes. This machine reduces human workforce and gives the finest accuracy. Since the machine design allows the two aspects to be used alternatively, the productivity increases and so does the space required for setting the machine.

### Future scope

It is predicted by some additive manufacturing advocates that this technological development will change the perception of people regarding manufacturing because end users will be able to do their own manufacturing rather than engaging to buy products from other people and corporations. With effects on energy use, waste reduction, customization, product availability, medicine, art, construction and sciences, 3D printing will change the manufacturing world as we know it, while laser cutting removes the chances of errors in cutting the sample pieces with more accuracy and perfection. As a result, the productivity increases and we can save too much time and material for future. At last, we can work to eliminate smoke problem and black residues which are left during the burning of leather. That's a real challenge for the future technocrats.

### References :-

1. KianooshTorabi, Ehsan Farjood, and Shahram Hamedani, Rapid Prototyping Technologies and their Applications in Prosthodontics, a Review of Literature, J Dent (Shiraz). 2015 Mar; 16(1): 1–9.
2. Leslie Langnau, Subtractive Manufacturing: What You Need to Know, Magazine on Make Parts Fast: Design guide, October 3, 2011.

3. SomenathGanguly, Comprehensive footwear technology, Journal of Indian Leather Technologists Association, Kolkata, India
4. Senthil Kumar, Laser cutting process – A Review, International Journal of Darshan Institute on Engineering Research & Emerging Technologies, Vol. 3, No. 1, 2014.
5. Hecht, Jeff (1992). The Laser Guidebook (Second ed.). New York: McGraw-Hill, Inc. p. 317. ISBN 0-07-027738-9.

### Some useful weblink-

6. <https://electronicscoach.com/laser-diode.html>
7. <https://www.elprocus.com/wp-content/uploads/2017/03/Principle-of-Laser-Action.jpg>
8. [https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcS65gKA\\_rxChGNgZ4tSKSXYm\\_dQdCKJNE-bgpLreJ7qKvLX4VOB](https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcS65gKA_rxChGNgZ4tSKSXYm_dQdCKJNE-bgpLreJ7qKvLX4VOB)
9. <https://3dprinting.com/what-is-3d-printing/>
10. <https://www.sculpteo.com>
11. <https://www.3dhubs.com/knowledge-base/introduction-fdm-3d-printing>
12. <https://www.materialise.com/en/manufacturing/3d-printing-technology/fused-deposition-modeling>
13. [https://www.researchgate.net/profile/John\\_Ryan\\_Dizon3/publication/321702417/figure/fig5/AS:614302444687362@1523472524392/FDM-setup-243.png](https://www.researchgate.net/profile/John_Ryan_Dizon3/publication/321702417/figure/fig5/AS:614302444687362@1523472524392/FDM-setup-243.png)
14. <https://www.troteclaser.com>
15. <https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits/semiconductor-diodes/laserdiode.html>
16. <https://www.allaboutcircuits.com/technical-articles/an-introduction-to-laser-diodes/>





SPONSORED BY:



*We care for the environment*

# CALCUTTA LEATHER COMPLEX TANNERS ASSOCIATION

AN ISO CERTIFIED COMPANY

**Think Leather, Think Bengal**



ILTA  
Since 1950



raw hide to fashion ramp, caring leather



Alcems Marketing Pvt. Ltd.



Tanian Colors & Chemicals



Tanchemie Specialties Inc.

*Susanta Mallick*

alcems@gmail.com  
98300 52522

## LESSON ON LEATHER GOODS

**Shome Nath Ganguly**

Former Principal of Karnataka Institute of Leather Technology

(The purpose of this article is to advise the students as well as artisans engaged in leather goods industry.

Shri Puranjan Mazumder of FREYA helped me to prepare this article)

### NON TRADITIONAL LEATHER USED IN THE FOOTWEAR INDUSTRIES

(PART - 3)

#### KANGAROO LEATHER



Among the most common of the large land mammals living wild, Kangaroos (macropods) have a limited range. These animals are confined only in Australia.

Kangaroo leather is a strong light weight leather derived from the hide of the kangaroo. Kangaroos are harvested. The meat and the hides of Kangaroo are sold in the market. Although most species of macro pods are protected from hunting by law, a small number of the large-sized species which exist in high numbers can be hunted by commercial hunters.

The population of this particular animal is in excess of 25 millions. 48 number of species are available in Australia. Only 4 of the above species are commercially harvested. In addition 2 species of Wallaby are harvested in Tasmania. A significant developments have been seen during last 40 years in Australia. But during last 10 years it is noticed that the Kangaroo industry has potential economic & environment benefit. In 2008 Green peace suggested that there would be environment benefit from reducing consumption of beef and replacing it with consumption of Kangaroo meat.

CSIRO (Commonwealth Science & Research Organisation) conducted study in Australia confirms that kangaroo is one of the strongest leather of similar substance available. The leather is used in a wide variety of shoes. The unique structure of kangaroo leather allows it to be cut down to very thin substance (thickness of the leather) but still retain tensile strength. Kangaroo leather is also popular in the manufacture of motorbike leathers and is used in a wide variety of other applications such as car upholstery, military boots, football or soccer boots and fashion accessories. Kangaroo leather is the material of choice for whip makers as the strips can be cut thin to keep the whip flexible, without sacrificing durability.

Studies conducted by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) confirm that kangaroo is one of the strongest leathers of similar substance available. Similarly when split into thinner substances kangaroo retains considerably more of the original tensile strength of the unsplit leather than does calf. When split to 20% of original thickness kangaroo retains between 30 and 60% of the tensile strength of the unsplit hide. Calf split to 20% of original



ILTA  
Since 1950

thickness, on the other hand, retains only 1– 4% of original strength Kangaroo leather is lighter and stronger than the hide of a cow or goat. It has 10 times the tensile strength of cowhide and is 50% stronger than goatskin. Studies of the morphology of kangaroo leather help explain its particular properties. The collagen fibre bundles in cattle hide are arranged in a complex weaving pattern. The fibres are often at angles as much as 90 degrees to the skin surface. Cattle hide also contains sweat glands, erector pili muscles and a distinct gradation in elastin levels, concentrated in the upper part of the skin.

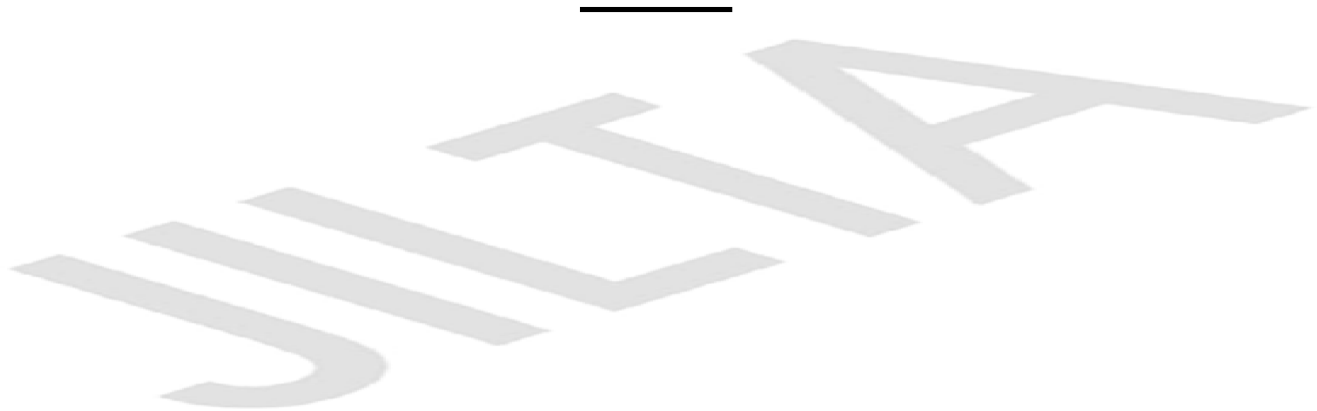
Kangaroo hide on the other hand has been shown to have a highly uniform orientation of fibre bundles in parallel with the skin surface. It does not contain sweat glands or erectorpili muscles and elastin is evenly distributed throughout the skin thickness. This structural uniformity explains both the greater tensile strength of the whole leather and the greater retention of strength in splits. Bovine skin is much more complex in cross section. Hence in whole section it has many more weak points from which tears can start when placed under tension. In addition when sliced into splits the collagen fibres running at significant angles to the skin surface will be cut. These then become weak points in the structural strength.

### Environmental aspects

The Australian kangaroo industry produces a range of meat and leather products from animals harvested from the wild under strict government controlled Management Plans. These ensure the harvest is sustainable and humane. A wide cross section of Australian ecologists support the kangaroo industry as being both sustainable and environmentally wise. Many argue kangaroos, which are native to Australia, are a more

environmentally friendly livestock option than introduced sheep and cattle. Kangaroos have small chest development and so require less water to breathe than placental mammals, which usually must expand a diaphragm. This means they lose more moisture in respiration. Kangaroos just make small pants while immobile and in motion expand and contract their lungs effectively using their leg muscles. The belly flops up and down, contracting and expanding the lungs respectively. Also, the kangaroo's paw is softer and does not compact the ground as hooved cattle and sheep do. Instead, its hopping leaves very small bowl-shaped cuts in the surface of even dry clay soil, which let native grass seeds carried on the wind settle into them. The bowl shape concentrates any moisture that may fall into it into a wet point that the grass seed can use to germinate. Thus, kangaroos deplete the water table at a slower rate than cattle or sheep and would even be viable in the absence of any bore water at all. The ecological arguments for kangaroos replacing sheep and cattle as arid land livestock are compelling, though they must be set against objections of kangaroos' lack of domestication and breeding rate. Kangaroos are eaten in most states.

Kangaroo leather is the strongest leather available. Its structure consists of highly organised main fibre bundles, which have a secondary supporting mesh. Combined with low angle of weave, low fat content and a very thin grain layer this provides superior strength against leathers from other raw material types at similar thickness. Naturally thin, kangaroo leather retains all its strength where other raw material types require heavy splitting and shaving which significantly reduces physical performance. The unique properties of kangaroo fibre structure are further enhanced through our innovative processing techniques which provide product designers with a versatile, strong and light natural materials.





Excellent –  
the TFL effect, that  
brings a smile on my  
customer's face.



End articles with real added value make a customer smile. TFL offers innovative technologies that are environmentally friendly, RSL compatible and of highest quality providing the best individual solution for a tanner's or coater's every day challenges. With TFL one can rely on the great expertise of our technicians giving excellent advice for the application to add real value to the final article. Experience the TFL-effect.

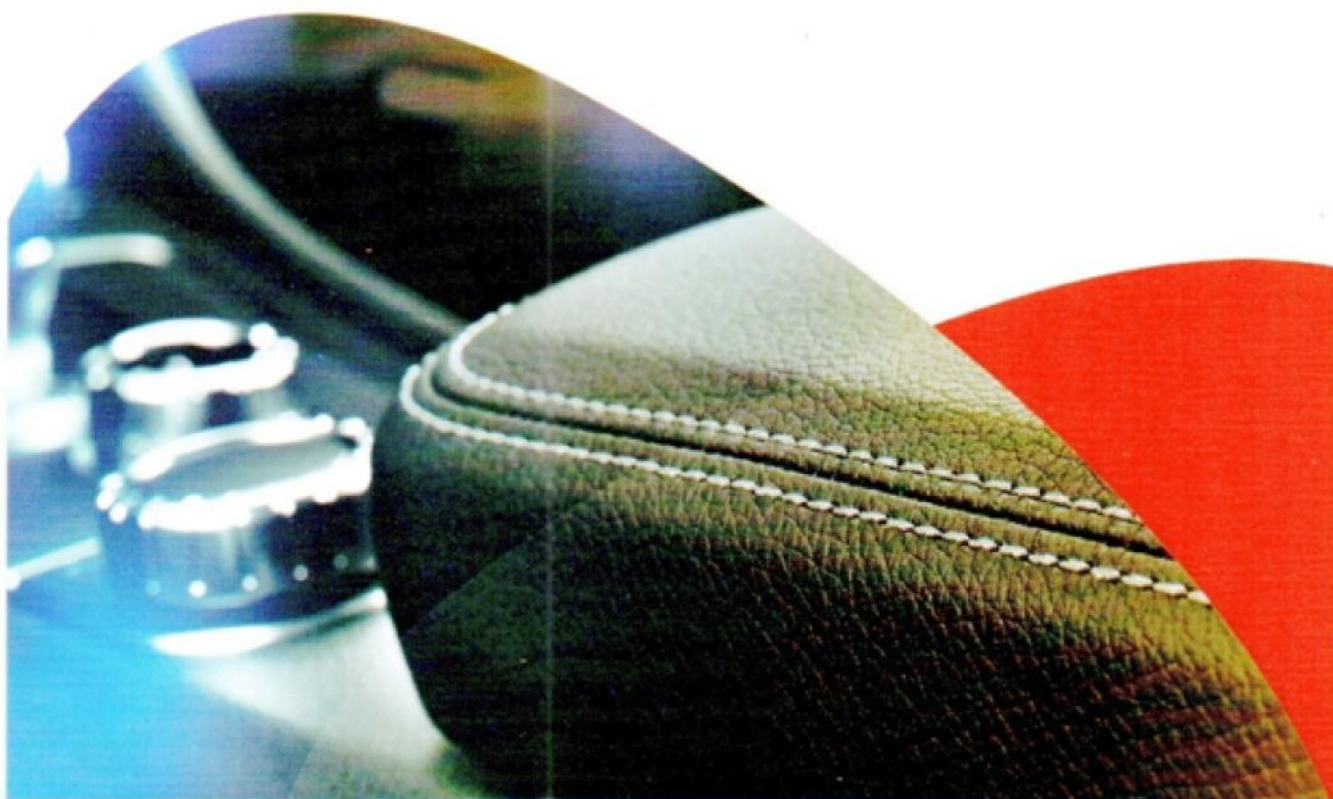


**TFL – Great chemicals. Excellent advice.**





Excellent –  
The next step  
to low emission  
in car interiors



Emissions of volatile organic compounds from automotive leather can affect the car interior air quality. Chemicals applied in the leather processing may cause unwanted VOC emission. Therefore TFL has performed a careful screening of products used from beamhouse to finishing. Enjoy high air quality in your car with significantly reduced emissions powered by CORIPOL® LE and RODA® Tec AI.

 [www.tfl.com](http://www.tfl.com)

**TFL – Great chemicals. Excellent advice.**







This valuable Article was published in Vol.- 42, No. - 01, January, 1992 of JILTA



## Fact or Fiction, Tannery Effluents Polluting Ganga ?

Prof. S. S. DUTTA

College of Leather Technology, Calcutta.

Very recently the environmental department of the Government of India and other similar organizations of the State Government are creating pressure on the owners of tanneries at Dhapa area of Calcutta to do at least the primary treatments to their tannery effluents before discharging them to the river Ganga called Vagirathi. Because the average suspended solid content and the average biochemical oxygen demand (B.O.D.) including chemical oxygen demand (C.O.D.) of such tannery effluents are 1,50,000 p.p.m and 7,000 p.p.m respectively, such pressure is quite natural and justified. But one must be sure, before imposing restrictions that the tannery effluents, however worst that may be, actually enter into the river Ganga in the unstable form. Our present method of effluent treatment is nothing but a process of converting unstable effluent to stable water. If effluents of Dhapa tanneries actually enter into the river Ganga in the unstable form, then definitely such restrictions

should be a must, however costly that may be. But, on the other hand, if it is found that the tannery effluents, in the stabilized form, are mixing with the water of Ganga, then the imposition of such restrictions on the tannery effluent disposal will be unjustified and whimsical. Already the leather industry of India, particularly of West Bengal, is at the point of dying due to the unstable conditions of the export and import markets. The condition of the internal market is also not very sound. A member of even a very high middle class family thinks twice today before purchasing a pair of leather shoe or a leather product due to their unbelievable high prices. Above all, India is now passing through a transitional period, as far as her economy is concerned. It is therefore not time to do any unnecessary expenditure. Every penny of the country should be spent after being sure that such expenditure or investment is absolutely necessary for the nation.

### METHODS OF EFFLUENT TREATMENT

Even though highly complicated technical words are used by experts to describe the effluent treatment methods but its principle is very simple and understandable by all. There are mainly two methods to stabilize effluent and those are (1) quick artificial method and (2) slow natural process. In the quick artificial method the effluent is treated with different chemicals and or gases and finally filtered through different types of filter like trickle filter, reverse osmosis, sand bed filter, pressure filter etc. In trickle filter, of course, filtration and stabilization go on side by side. This quick artificial method can be followed only when the volume of the effluent is small. But, unfortunately, the volume of the tannery effluent is vast. To produce one kilogramme of leather a tannery generally discharges 60 to 70 litres of effluent. It has been presumed, on the other hand, that Eastern India's contribution is something like 25 to 30



percent of India's total leather production. If Dhapa tanneries of Calcutta produce only 10% of India's total, then their production will not be less than 20 million kgs. of finished leather per year or 0.06 million Kg per day. Thus the volume of tannery effluents from Dhapa tanneries comes to 3.9 million litres per day. This huge volume of effluent can never be stabilized by the quick artificial method, at least that will not be economically feasible. So, it has been suggested by the experts that the tannery effluents should be stabilized by the less expensive slow natural process.

#### SLOW NATURAL PROCESS

In this method the effluent is stored in a tank and kept undisturbed for few days so that major portion of the suspended solids may settle here at the bottom due to gravity. The clear liquid from the top is then brought in contact with the soil of the earth by transferring the liquid into big brick-pits containing sufficient soil or into kancha pits. The liquid is kept there for several days for the putrefaction of dissolved organic matters or for structural changes of the inorganic compounds present in the effluent. The microorganisms either already present in the soil of the earth or formed in the soil at the time of necessity do this putrefaction job. These microorganisms convert the organic matters and also the inorganic chemicals by aerobic or anaerobic processes to harmless

products in 10 to 15 days. The clear solution from the top is then allowed to absorb atmospheric oxygen either by natural process or artificially by blowing air through the liquid or by agitating the liquid in presence of atmospheric air. Thus the occluded oxygen content of the liquid goes up. Finally this liquid is discharged to the receiving water source.

#### EXISTING EFFLUENT TREATMENT PLANT

When the process of stabilizing effluent is so simple, the tanners of Dhapa tanneries had been doing the same from the very beginning unknowingly. These tanners discharge their tannery effluents directly into the Calcutta Canal through which the effluent moves 7 to 8 miles distance in 10 to 15 days before reaching the river Ganges. The rate of flow of the effluent through this canal is something like one to two feet per minute. Within one mile from the point of discharge, the canal acts as a settling tank because most of the calcium settles there as calcium carbonate. Chromium also precipitates within this part of the canal as chromium hydroxide.

The liquid from the top flows further through the canal and get mixed with huge volume of Calcutta city-sewages. The Central Leather Research Institute, Madras, has proved through repeated experiments that the microorganisms present in the city sewages are ideal organisms to stabilize tanne

effluent, provided the volume ratio of city sewage to tannery effluent is 10 : 1. That the tannery effluent gets stabilized by the microorganisms can be noticed by any one in the canal between the Belegkata and Maniktala Khal Bridges. The evolution of different gases like nitrogen, hydrogen, carbondioxide, oxygen, methane etc. in the form of bubbles due to metabolic reactions in this region of the canal is the proof of such stabilization of the effluent. Here both aerobic and anaerobic reactions take place side by side. On the surface, where water comes in contact with the atmospheric air, the aerobic metabolic degradation is prominent while the anaerobic reactions go on at the bottom of the canal water.

After Maniktala Khal Bridge the clear stabilized tannery effluent absorbs oxygen from the atmosphere following the Henry's Law of Physical Chemistry and becomes sufficiently rich with occluded oxygen before reaching the river Ganga.

#### WHY CANAL WATER AT THE ESTUARY IS SO POOR ?

If the tannery effluent actually gets stabilized and clear in the canal itself then, one can argue, why the BOD and total suspended solid content of the canal water at the point where it joins the river Ganga are so high ! That is perhaps due to the city sewages which reach the canal after Manicktala Khal-Bridge. These city sewages do

not get sufficient time to be stabilized and reach the river Ganga within a day or two. The BOD and suspended solid content of this water would be much higher if there was no stabilized tannery effluent in it. This stabilized tannery effluent actually acts as diluent for the unstabilized city sewages received by the canal after Manicktala Khal Bridge.

### HOW TO PROVE IT ?

The author therefore feels that the CMDA or Calcutta Corporation should do something to stabilize the city sewages which are discharged to the canal after Manicktala Khal Bridge first, instead of imposing strict restrictions on Dhapa tanneries which have not yet been proved guilty for the high BOD and solid content of canal water at the estuary.

If it is found that the quality of canal water at the estuary has not improved inspite of having effluent treatment arrangements for city sewages and industrial effluents discharged in the canal after Manicktala Khal-Bridge, the Dhapa tanneries and other industries of that locality can be made responsible for polluting Ganga-water. In the second phase these industries may be forced to have effluent treatment plants of their own.

### FUTURE OF THE CANAL

The question will now arise whether this dirty canal should be allowed to flow through the heart

of the city like Calcutta where there is acute shortage of land. No wise thinker will suggest to fill up this canal. In every populated city of the world the Government digs such canal to bifurcate the highly populated areas on account of health and fire grounds. Moreover, such canal caters huge amount of rain water during rainy seasons and acts as a good medium for transportation. The drainage system of Calcutta city is not developed enough to drain out the entire rain water of the city without the help of this canal. Unfortunately, the authority did not perhaps realise the importance of this canal and their apathy and unwise thinking were responsible for its present miserable condition.

### WHY THIS CANAL IS SO DIRTY ?

During British time this canal was connected with the Bay of Bengal through Sundarban forest on one side and with river Ganga on the other and naturally there was tide in it. This tide carried away huge amount of dirt of the city to the ocean keeping the city clean. Between Calcutta and Sundarban areas large number of boats and small launches would move with goods through this canal. These boats and launches used to agitate the canal water which was an ideal method of aeration to reduce the BOD of the canal water. Because the canal was connected with the sea, huge number of snails and cockles were available in this canal.

People used to collect their shells and burn them on the banks of the canal outside the city to get pure chemical lime called fat lime, It is really very sad that one cannot get a pound of fat-lime in the Calcutta market today, even though this lime is the ideal one for chewing bittle and almost harmless to human system for its minimum content of insoluble matters. Poor bittle chewers everyday consume harmful rock lime containing 60 to 65 percent insoluble matters like compounds of iron, aluminium, magnesium, silicon etc and clay. It is said by many historians that the name of this city became Calcutta perhaps from these lime vatties (Kali-lime ; Katta-lime kilns called vatties or paste of lime). During rainy seasons the residual lime of these lime vatties used to flow to canal water to keep the latter clean.

Unfortunately, due to some unwise decision the canal was disconnected from the sea and that was perhaps one of the reasons for the present precarious condition of the canal.

### BEAUTIFICATION OF CALCUTTA

When CMDA is trying their best to beautify the city, Calcutta, how a canal carrying city sewages and industrial effluents can be allowed to flow through this city! Will it not pollute the air and give the city an ugly look? Yes, this is a very pertinent question. The canal is so dirty and ugly looking



because it carries at present only city sewage and industrial effluents and there is no extra water flowing through it. If the canal is connected with the sea, as before, there will be plenty of water in it to dilute the present dirty solution of very high concentration. Moreover, due to tide major portion of the dirt will be washed away to the sea daily. Of course, in this arrangement the rate of flow of the water in the canal will increase considerably and therefore some amount of unstabilized canal water may flow to the river Ganga through the other end of the canal. To prevent this the British Government provided Sluice (gate) at the estuary on the Ganga side. Occasionally the sluice was opened when the BOD and solid content of the canal water had been found low due to sufficient stabilization of water by the microorganisms. The evolution of harmful gases like carbon dioxide, in that case, was much less. There were large number of trees on both the banks of the canal to absorb these gases. Where those trees

have gone today? Can we not plant again large number of useful trees on both the sides of this canal and give it a look like the river Seine of Paris?

#### DISPOSAL OF CANAL SLUDGE

Even, if the canal is connected with the sea and occasional dredging arrangement is made, then also some amount of sediment or sludge will settle at the bottom of the canal very slowly. This sludge is produced by the microorganisms as their extrusions. Naturally slight digging of the canal once after every 20 to 25 years will be needed. What to do with that sludge? This sludge is very unfertile and therefore in many developed countries like Japan it is dried and melted to manufacture very hard bricks for road construction. In Calcutta this sludge can be used to fill up the huge ditches created by the brick makers and sand collectors. If this sludge remains in contact with earth under direct sun light, it regains its fertility

within 4 to 5 years. If with this sludge the garbages of Calcutta, which are dumped now at Dhapa maidan, are mixed, the regaining rate of fertility of the sludge will be highly accelerated. So the disposal of canal-sludge in Calcutta will not be a problem.

#### SUMMARY

To solve the effluent and city-sewage disposal problem the Government of West Bengal, CMDA, Calcutta Corporation and Government of India should immediately take joint steps to (1) connect the canal again with the Bay of Bengal through the Sundarban forest (2) plant large number of useful trees on both the side of the canal (3) make arrangements to keep flow in the canal by occasional digging and dredging and (4) provide a sluice gate at the estuary to the Hooghly river side. The condition of the canal water, in that case, will not be worse than the water of the river Thames of London.

\* The author expresses his hearty thanks to Dr. H. Bhaumik, Principal, College of Leather Technology, Calcutta, for requesting the author to write a paper on Calcutta Canal.

The opinion expressed by the author is not necessarily the views of the Association.

# SCENARIO OF THE GROWTH RATE & STATISTICS OF PRESENT INDIAN ECONOMY : SIGNIFICANTLY DRIVEN BY IT'S FOREIGN TRADE POLICY



**Bibhas Chandra Paul, Officer on Special Duty, ILTA, Kolkata**

## Introduction

Right now India has emerged as the fastest growing major economy in the world and is expected to be one of the top three economic powers of the world over the next 10-15 years, backed by its strong democracy and partnerships. The integration of the domestic economy through the twin channels of trade and capital flows has accelerated in the past two decades which in turn led to the India's GDP reaching Rs 167.73 trillion (US\$ 2.30 trillion) in 2017-18\*. Simultaneously, the per capita income also nearly trebled during these years. India's trade and external sector had a significant impact on the GDP growth as well as expansion in per capita income. India's GDP during the first half of 2018-19 stood at Rs 89.88 trillion (US\$ 1.29 trillion).

## Market size

India's GDP is estimated to have increased 6.6 per cent in 2017-18 and is expected to grow 7.3 per cent in 2018-19. During the first half of 2018-19, GDP (at constant 2011-12 prices) grew by 7.6 per cent. India has retained its position as the third largest startup base in the world with over 4,750 technology startups, with about 1,400 new start-ups being founded in 2016, according to a report by NASSCOM.

India's labour force is expected to touch 160-170 million by 2020, based on rate of population growth, increased labour force participation, and higher education enrolment, among other factors, according to a study by ASSOCHAM and Thought Arbitrage Research Institute. India's foreign exchange reserves were US\$ 393.29 billion in the week up to December 21, 2018, according to data from the RBI.

## Recent Developments

With the improvement in the economic scenario, there have been various investments in various sectors of the economy.

The M&A activity in India increased 53.3 per cent to US\$ 77.6 billion in 2017 while private equity (PE) deals reached US\$ 24.4 billion. Some of the important recent developments in Indian economy are as follows:

- v Exports from India increased 15.48 per cent year-on-year to US\$ 351.99 billion in April-November 2018.
- v Nikkei India Manufacturing Purchasing Managers' Index (PMI) stood at 53.2 in December 2018, showing expansion in the sector.
- v Mergers and Acquisitions (M&A) activity in the country has reached US\$ 82.1 billion in 2018 (up to November).
- v Income tax collection in the country reached Rs 2.50 lakh crore (US\$ 35.88 billion) between April-November 2018.
- v Companies in India have raised around US\$ 5.52 billion through Initial Public Offers (IPO) in 2018 (up to November).
- v India's Foreign Direct Investment (FDI) equity inflows reached US\$ 389.60 billion between April 2000 and June 2018, with maximum contribution from services, computer software and hardware, telecommunications, construction, trading and automobiles.
- v India's Index of Industrial Production (IIP) rose 5.6 per cent year-on-year in April-October 2018.
- v Consumer Price Index (CPI) inflation rose moderated to 2.33 per cent in November 2018 from 3.38 per cent in October 2018.

\*Corresponding author E-mail : bibhas7@gmail.com



- v Around 10.8 million jobs were created in India in 2017.
- v India has improved its ranking in the World Bank's Doing Business Report by 23 spots over its 2017 ranking and is ranked 77 among 190 countries in 2019 edition of the report.
- v India is expected to have 100,000 startups by 2025, which will create employment for 3.25 million people and US\$ 500 billion in value, as per Mr T V Mohan Das Pai, Chairman, Manipl Global Education.
- v The World Bank has stated that private investments in India is expected to grow by 8.8 per cent in FY 2018-19 to overtake private consumption growth of 7.4 per cent, and thereby drive the growth in India's gross domestic product (GDP) in FY 2018-19.
- v India is expected to retain its position as the world's leading recipient of remittances in 2018, with total remittances touching US\$ 80 billion, according to World Bank's Migration and Development Brief.

## Government Initiatives

The Union Budget for 2018-19 was announced by the Union Minister for Finance, Government of India, in Parliament on February 1, 2018. This year's budget will focus on uplifting the rural economy and strengthening of the agriculture sector, healthcare for the economically less privileged, infrastructure creation and improvement in the quality of education of the country. As per the budget, the government is committed towards doubling the farmers' income by 2022. A total of Rs 14.34 lakh crore (US\$ 196.94 billion) will be spent for creation of livelihood and infrastructure in rural areas. Budgetary allocation for infrastructure is set at Rs 5.97 lakh crore (US\$ 81.99 billion) for 2018-19. All-time high allocations have been made to the rail and road sectors.

India's unemployment rate is expected to be 3.5 per cent in 2018, according to the International Labour Organisation (ILO).

Numerous foreign companies are setting up their facilities in India on account of various government initiatives like Make in India and Digital India. Mr. Narendra Modi, Prime Minister of India, has launched the Make in India initiative with an aim to boost the manufacturing sector of Indian economy, to increase the purchasing power of an average Indian consumer, which

would further boost demand, and hence spur development, in addition to benefiting investors. The Government of India, under the Make in India initiative, is trying to give boost to the contribution made by the manufacturing sector and aims to take it up to 25 per cent of the GDP from the current 17 per cent. Besides, the Government has also come up with Digital India initiative, which focuses on three core components: creation of digital infrastructure, delivering services digitally and to increase the digital literacy.

Some of the recent initiatives and developments undertaken by the government are listed below:

- v National Institute for Transforming India (NITI) Aayog released a strategic document titled 'Strategy for New India @75' to help India become a US\$ 4 trillion economy by FY23.
- v The Government of India is going to increase public health spending to 2.5 per cent of GDP by 2025.
- v The Government of India released the maiden Agriculture Export Policy, 2018 which seeks to double agricultural exports from the country to US\$ 60 billion by 2022.
- v Around 1.29 million houses have been constructed up to December 24, 2018, under Government of India's housing scheme named Pradhan Mantri Awas Yojana (Urban).
- v Village electrification in India was completed in April 2018.
- v Around 22.43 million households have been electrified up to December 17, 2018 under the Pradhan Mantri Sahaj Bijli Har Ghar Yojana (SAUBHAGYA). Moreover, 100 per cent household electrification has already been achieved in 25 states, as of December 2018.
- v Prime Minister's Employment Generation Programme (PMEGP) will be continued with an outlay of Rs 5,500 crore (US\$ 755.36 million) for three years from 2017-18 to 2019-20, according to the Cabinet Committee on Economic Affairs (CCEA).
- v The target of an Open Defecation Free (ODF) India will be achieved by October 2, 2019 as adequate funding

is available to the Swachh Bharat Mission (Gramin), according to Ms Uma Bharti, Minister of Drinking Water and Sanitation, Government of India.

- v The Government of India has decided to invest Rs 2.11 trillion (US\$ 32.9 billion) to recapitalise public sector banks over the next two years and Rs 7 trillion (US\$ 109.31 billion) for construction of new roads and highways over the next five years. As of November 2018, Rs 82,000 crore (US\$ 11.75 billion) has already been infused and the government is planning to infuse Rs 42,000 crore (US\$ 6.02 billion) more by March 2019.
- v The mid-term review of India's Foreign Trade Policy (FTP) 2015-20 has been released by Ministry of Commerce & Industry, Government of India, under which annual incentives for labour intensive MSME sectors have been increased by 2 per cent.

### Role of Foreign Trade Policy

Total exports from India (Merchandise and Services) increased 15.48 per cent year-on-year during April-November 2018 to US\$ 351.99 billion, while total imports increased by 16.86 per cent year-on-year to US\$ 428.18 billion according to data from the Ministry of Commerce & Industry. Exports from the country recorded their highest growth in 2017-18.

According to the, Minister for Commerce and Industry, the Government of India is keen to grow exports and provide more jobs for the young, talented, well-educated and even semi-skilled and unskilled workforce of India.

### Capital Inflows

India's foreign exchange reserves were US\$ 393.29 billion in the week up to December 21, 2018, according to data from the RBI.

### External Sector

- v In November 2018, India and Iran had signed a bilateral agreement to settle oil trades in Indian currency through public sector bank United Commercial Bank (UCO) Bank.
- v In June 2018, a Memorandum of Understanding (MoU) was signed between the Governments of India

and China to export non-basmati rice to China. As of October 2018, total 24 mills got clearance to export the same.

- v Bilateral trade between India and China reached US\$ 84.44 billion in 2017 with 40 per cent increase in Indian exports to China.
- v In August 2018, US upgraded India's status as a trading partner on par with its North Atlantic Treaty Organization (Nato) allies.
- v India's external sector has a bright future as global trade is expected to grow at 4 per cent in 2018 from 2.4 per cent in 2016.
- v Bilateral trade between India and Ghana is rising exponentially and is expected to grow from US\$ 3 billion to US\$ 5 billion over the coming three years, stated Mr Aaron Mike Oquaye Junior, Ghana's Ambassador to India.
- v India has revised its proposal on trade facilitation for services (TFS) at the World Trade Organisation (WTO) and has issued a new draft, with the contents being more meaningful and acceptable to other member countries.
- v The Union Cabinet, Government of India, has approved the proposed Memorandum of Understanding (MoU) between Export-Import Bank of India (EXIM Bank) and Export-Import Bank of Korea (KEXIM).
- v The Goods and Services Network (GSTN) has signed a memorandum of understanding (MoU) with Mr Ajay K Bhalla, Director General of Foreign Trade (DGFT), to share realised foreign exchange and import-export code data, process export transactions of taxpayers under goods and services tax (GST) more efficiently, increase transparency and reduce human interface.
- v In March 2017, the Union Cabinet approved the signing of the customs convention on the international transport of goods, Transports Internationaux Routiers (TIR) making India the 71st



signatory to the treaty, which will enable the movement of goods throughout these countries in Asia and Europe and will allow the country to take full benefit of the International North South Transportation Corridor (INSTC).

- v Mr Richard Verma, the United States Ambassador to India, has verified that India-US relations across trade, defence and social ties will be among the top priorities of the newly elected US President Mr Donald Trump's administration.

## The Policy analysis

- v In the Mid-Term Review of the Foreign Trade Policy (FTP) 2015-20 the Ministry of Commerce and Industry has enhanced the scope of Merchandise Exports from India Scheme (MEIS) and Service Exports from India Scheme (SEIS), increased MEIS incentive raised for ready-made garments and made-ups by 2 per cent, raised SEIS incentive by 2 per cent and increased the validity of Duty Credit Scrips from 18 months to 24 months.
- v As of December 2018, Government of India is planning to set up trade promotion bodies in 15 countries to boost exports from Small and Medium Enterprises (SME) in India.
- v In September 2018, Government of India increased the duty incentives for 28 milk items under the Merchandise Export from India Scheme (MEIS).
- v All export and import-related activities are governed by the Foreign Trade Policy (FTP), which is aimed at enhancing the country's exports and use trade expansion as an effective instrument of economic growth and employment generation.
- v The Department of Commerce has announced increased support for export of various products and included some additional items under the Merchandise Exports from India Scheme (MEIS) in order to help exporters to overcome the challenges faced by them.
- v The Central Board of Excise and Customs (CBEC) has developed an 'integrated declaration' process leading

to the creation of a single window which will provide the importers and exporters a single point interface for customs clearance of import and export goods.

- v As part of the FTP strategy of market expansion, India has signed a Comprehensive Economic Partnership Agreement with South Korea which will provide enhanced market access to Indian exports. These trade agreements are in line with India's Look East Policy. To upgrade export sector infrastructure, 'Towns of Export Excellence' and units located therein will be granted additional focused support and incentives.
- v RBI has simplified the rules for credit to exporters, through which they can now get long-term advance from banks for up to 10 years to service their contracts. This measure will help exporters get into long-term contracts while aiding the overall export performance.
- v The Government of India is expected to announce an interest subsidy scheme for exporters in order to boost exports and explore new markets.

## Conclusion

India is presently known as one of the most important players in the global economic landscape. Its trade policies, government reforms and inherent economic strengths have attributed to its standing as one of the most sought after destinations for foreign investments in the world. Also, technological and infrastructural developments being carried out throughout the country augur well for the trade and economic sector in the years to come.

Boosted by the forthcoming FTP, India's exports are expected reach US\$ 750 billion by 2018-2019 according to Federation of India Export Organization (FIEO). Also, with the Government of India striking important deals with the governments of Japan, Australia and China, the external sector is increasing its contribution to the economic development of the country and growth in the global markets. Moreover, by implementing the FTP 2014-19, by 2020, India's share in world trade is expected to double from the present level of three per cent.

India's gross domestic product (GDP) is expected to reach US\$ 6 trillion by FY27 and achieve upper-middle income status on the back of digitization, globalization, favourable demographics, and reforms.



India's revenue receipts are estimated to touch Rs 28-30 trillion (US\$ 385-412 billion) by 2019, owing to Government of India's measures to strengthen the infrastructure and reforms like Demonetization and Goods and Services Tax (GST), although all these policies made a regardless setback to the people of India.

India is also focusing on renewable sources to generate energy. It is planning to achieve 40 per cent of its energy from non-fossil sources by 2030 which is currently 30 per cent and also have plans to increase its renewable energy capacity from to 175 GW by 2022.

India is expected to be the third largest consumer economy as its consumption may triple to US\$ 4 trillion by 2025, owing to shift in consumer behavior and expenditure pattern, according to a Boston Consulting Group (BCG) report; and is estimated to surpass USA to become the second largest economy in terms of purchasing power parity (PPP) by the year 2040, according to a report by PricewaterhouseCoopers.

## References :

- v [https://en.wikipedia.org/wiki/Economic\\_development\\_in\\_India](https://en.wikipedia.org/wiki/Economic_development_in_India)
- v <https://tradingeconomics.com> › India
- v <https://www.statista.com> › International › India
- v <https://www.businesstoday.in/current/economy-politics/indian-economy-loses-momentum-gdp-growth-slows-down-to-7-1-percent-in-september-quarter/story/296132.html>
- v <https://www.tutor2u.net/economics/reference/india-economic-growth-and-development>
- v <https://www.indiafilings.com/learn/foreign-trade-policy/>
- v [dgft.gov.in/policies/foreign-trade-policy](http://dgft.gov.in/policies/foreign-trade-policy)
- v <https://www.ibef.org> › Indian Economy
- v [https://www.fieo.org/view\\_section.php?lang=0&id=0,30,155](https://www.fieo.org/view_section.php?lang=0&id=0,30,155)
- v [www.eximguru.com](http://www.eximguru.com) › Exim › EXIM-POLICY

### E-WAYBILL TO BE INTEGRATED WITH NHAI'S FASTag TO TRACK GST EVASION FROM APRIL' 19



The GST e-way bill system is likely to be integrated with NHAI's FASTag mechanism from April to help track movement of goods and check GST evasion. The revenue department has set up an officers committee to integrate e-way bill, FASTag and DMIC's Logistics Data Bank (LDB) services, after consultation with transporters. "It has come to our notice that some transporters are doing multiple trips by generating a single e-way bill. Integration of e-way bill with FASTag would help find the location of the vehicle and when and how many times it has crossed NHAI's toll plazas," the official said.

The integrated system on an all-India basis is planned to be rolled out from April, the official told PTI. Karnataka is implementing an integrated system on a pilot basis, and integration at national level would be highly beneficial in terms of tracking of goods and ensuring that e-way bill has been generated for the correct duration of travel.

"The officers committee would explain the benefits to all stakeholders," an official said, adding the move would also improve operational efficiencies across the country's logistics landscape. Currently, lack of harmonisation under the 'track and trace' mechanism in terms of sharing information among different agencies is affecting the ease of doing business in the country. Besides, it is leading to misuse of e-way bill.

"This would also help in preventing goods and services tax (GST) evasion by unscrupulous traders who take advantage of the loopholes in the supply chain," the official said. Central tax officers have detected 3,626 cases of GST evasion/violations involving Rs 15,278.18 crore during April-December period.

Touted as an anti-evasion measure, e-way bill system was rolled out on April 1, 2018, for moving goods worth over Rs 50,000 from

one state to another. The same for intra or within the state movement was rolled out in a phased manner from April 15. Transporters of goods worth over Rs 50,000 would be required to present e-way bill during transit to a GST inspector, if asked.

"The integration of the e-way bill system with FASTag and LDB is expected to help boost tax collections by clamping down on trade that currently happens on cash basis," the official said. The National Highways Authority of India (NHAI) has put in place the FASTag system for collection of toll electronically on national highways.

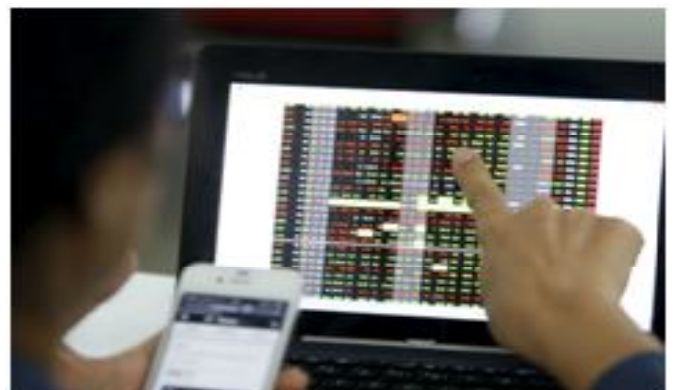
FASTag also offers non-stop movement of vehicles through toll plazas. Integration of e-way bill with FASTag will help revenue authorities track the movement of vehicles and ensure that they are travelling to the same destination as the transporter or the trader had specified while generating the e-way bill. It will also help the suppliers locate the goods through the e-way bill system.

Transporters, too, would be able to track their vehicles through SMS alerts that would be generated at each toll plaza. Similarly, Delhi-Mumbai Industrial Corridor's (DMIC's) container tracking services, also called LDB programme, would be integrated with the e-way bill to improve the logistics ecosystem.

With GST system now stabilising, the focus of the Central Board of Indirect Taxes and Customs is now on increasing compliance and checking evasion. The government has also set up the Directorate General of GST Intelligence (DGGSTI) to investigate cases of tax evasion and conduct search and seizure operations under the GST Act, and erstwhile Excise and Service Tax Act. As against the budgeted monthly revenue target of over Rs 1 lakh crore, GST collections have so far this fiscal averaged Rs 96,800 crore per month.

(Financial Express – 14/01/2019)

### GLOBAL MARKETS : ASIA SHARES SUBDUED AFTER MAY'S BREXIT VOTE DEFEAT, POUND STEADIES





ILTA  
Since 1950

Asian shares took a breather on Wednesday after rallying the previous day on Chinese stimulus hopes, with investors assessing Brexit options after British lawmakers trounced Prime Minister Theresa May's deal to withdraw Britain from the European Union.

May's crushing loss overnight triggered political upheaval that could lead to a disorderly exit from the European Union on March 29 or even to a reversal of the 2016 decision to leave.

Investors' short-term focus is now on a confidence vote on May's government by lawmakers later in the day. Sterling was last trading at \$1.2841 on the dollar, off about 0.1 percent. It had rallied more than a cent from the day's lows against the dollar with the sizable defeat for May seen forcing Britain to pursue different options.

"Elections tend to cause sell offs in markets because they're inherently uncertain events but the UK situation is more complex than a normal vote," said Stephanie Kelly, senior political economist at Aberdeen Standard Investments in Edinburgh.

"The margin of Theresa May's defeat and the call of no confidence do matter for markets in the short term," she said adding she expected sterling to be volatile until the result of the no-confidence vote is known.

May's defeat put pressure on UK-focused exchange-traded funds. A Tokyo-traded FTSE 100 ETF was down about one percent on Wednesday.

MSCI's broadest index of Asia-Pacific shares outside Japan was a touch lower, having swung up on Tuesday after Chinese officials came out in force to signal more measures to stabilise a slowing economy. Australian shares rose 0.2 percent while Japan's Nikkei lost 0.7 percent by midday.

China's central bank on Wednesday made its biggest daily net cash injection via reverse repo operations on record — totalling \$51.6 billion — in another sign of growing concern over risks facing the slowing economy. In Tuesday's session on Wall Street, the S&P 500 gained 1.1 percent as technology and internet stocks gained on Netflix Inc's plans to raise fees for U.S. subscribers.

China's central bank on Wednesday made its biggest daily net cash injection via reverse repo operations on record — totalling \$51.6 billion — in another sign of growing concern

over risks facing the slowing economy. In Tuesday's session on Wall Street, the S&P 500 gained 1.1 percent as technology and internet stocks gained on Netflix Inc's plans to raise fees for U.S. subscribers.

The S&P 500 communication services index, which includes Netflix and Alphabet Inc, jumped 1.7 percent, while the technology sector tacked on 1.5 percent. The China stimulus hints and dovish remarks by one of the U.S. central bank's most hawkish policymakers also helped lift the U.S. market.

Ester George, president of the Federal Reserve Bank of Kansas City and a voting member of the Fed's policy-setting committee this year, made the case for patience and caution on interest rate hikes to avoid choking off growth.

### SINO-U.S. TRADE TALKS

Sentiment was not helped by reported comments from United States Trade Representative Robert Lighthizer that he did not see any progress made on structural issues during U.S. talks with China last week.

Investors "are mainly focused on the outcome of the U.S.-China trade negotiations, but it may take more than a month before it will become clear," said Ayako Sera, market strategist at Sumitomo Mitsui Trust Bank. "It's hard for market sentiment to turn one way or the other, whether a recovery or decline, as long as it remains unclear what outcome there will be."

Lighthizer's caution helped force the dollar to remain on the defensive against the Japanese yen, a safe-haven currency that's often preferred by traders during times of market and economic stress. The greenback lost 0.2 percent at 108.50 yen. Elsewhere in the currency market, the euro lost 0.1 percent to \$1.1405, extending its decline against the dollar for a fifth session.

The single currency has lost nearly 1.5 percent from a 12-week high hit on Jan. 10. U.S. Treasuries steadied after a choppy overnight session. The yield on benchmark 10-year notes last stood at 2.711, a tad lower from 2.718 percent at the U.S. close on Tuesday.

In commodities, oil prices rose about 3 percent overnight supported by China's promise of more stimulus. Worries over

slowing China demand have been one of the key factors in the recent slide in oil.

International Brent crude oil futures were last off 7 cents, or 0.1 percent, at \$60.57 a barrel. U.S. crude futures were down 12 cents, or 0.2 percent, at \$51.99 a barrel.

Spot gold was 0.1 percent lower at \$1,288.40, holding not far off a seven-month peak of \$1,298.60 scaled on Jan. 4.

(Business Standard – 15/01/2019)

### IT RETURNS TO BE PROCESSED IN ONE DAY



Soon, your income tax return will be processed in just one day and refunds would be made quickly. This will be possible thanks to a new integrated portal of the Income Tax Department.

Meanwhile, the Government has also decided to recapitalize EXIM Bank to facilitate assistance to exporters.

The Union Cabinet, in its meeting held on Wednesday, approved a proposal for an Integrated E-filing & Centralized Processing Center 2.0 Project of the Income Tax Department. It would involve a cost of Rs 4,241 crore. "At present, the average return processing time is 63 days, which will be reduced to just one day," Railway Minister Piyush Goyal told presspersons after the Cabinet meeting. He also informed that Infosys was awarded the contract to develop the project in a transparent bidding process.

According to a Government statement, the broad objectives of this project include faster and accurate outcomes for taxpayers, first time right approach, enhancing the user experience at all stages, improving taxpayer awareness and education through continuous engagement, promoting voluntary tax compliance and managing outstanding demand.

The decision will ensure horizontal equity by processing returns filed by all categories of taxpayers across the country in a consistent, uniform, rule-driven, identity-blind manner. This will assure fairness in tax treatment to every taxpayer irrespective of their status. By faster processing of returns and issue of refunds to the taxpayer's bank account directly without any interface with the Department, by adhering to international best practices and standards (ISO certification) and by providing processing status updates and speedy communication using mobile app, email, SMS on the Department website, the decision will ensure transparency and accountability.

This approval has significant benefits for the department and taxpayers through various functionalities such as pre-filing of ITR and acceptance by the taxpayer as a means to improve accuracy and to reduce the refund/ processing turnaround time drastically, facilitation of taxpayers by resolving outstanding tax demands, integrated contact centres for taxpayer assistance and a tax payer outreach programme through digital media and an employer/ partner accreditation programme to bring significant enhancement in services to taxpayers.

In another decision, the Cabinet has approved recapitalisation to the tune of Rs 6,000 crore of EXIM Bank. It will be done through recap bonds and would be completed in two tranches. The first tranche of Rs 4,500 crore will be completed by March this year, while a second tranche of Rs 1,500 crore would be completed next fiscal. The Cabinet has also decided to increase the authorised capital to Rs 20,000 crore from Rs 10,000 crore.

(Business Line – 07/01/2019)

### HERE ARE THE LATEST INCOME TAX SLABS AND RATES





The tax liability for 30% tax bracket has increased by Rs 2,625. For middle and lowest income tax slab, the tax outgo hikes by Rs 1,125 and Rs 125 respectively.

The latest income tax slabs applicable for financial year 2018-19 (assessment year 2019-20) are given below. These slabs and tax rates are as announced by Budget 2018. □

In fact, Budget 2018 only increased total cess on income tax to 4% but made no change in the existing tax slabs and income tax rates. □

The basic exemption limit for an individual depends on his/her age as well as his/her residential status. □

### Income tax slabs for resident Individual below 60 years of age □

| <u>Taxable income slabs</u> | <u>Income tax rates and cess</u> □                               |
|-----------------------------|--|
| Up to Rs 2.5 lakh           | Nil  |
| Rs 2,50,001 to Rs 5,00,000  | 5% of (Total income minus Rs 2,50,000) + 4% cess                 |
| Rs 5,00,001 to Rs 10,00,000 | Rs 12,500 + 20% of (Total income minus Rs 5,00,000) + 4% cess    |
| Rs 10,00,001 and above      | Rs 1,12,500 + 30% of (Total income minus Rs 10,00,000) + 4% cess |

### Income tax slabs for resident individual between 60 and 80 years of age (Senior Citizen) □

| <u>Taxable income slabs</u> □ | <u>Income tax rates and cess</u> □                               |
|-------------------------------|--|
| Up to Rs 3 lakh               | Nil  |
| Rs 3,00,001 to Rs 5,00,000    | 5% of (Total income minus Rs 3,00,000) + 4% cess                 |
| Rs 5,00,001 to Rs 10,00,000   | Rs 10,000 + 20% of (Total income minus Rs. 5,00,000) + 4% cess   |
| Rs 10,00,001 and above        | Rs 1,10,000 + 30% of (Total income minus Rs 10,00,000) + 4% cess |

### Income tax slabs for resident individual above 80 years of age (Super Senior Citizen) □

| <u>Taxable income slabs</u> □ | <u>Income tax rates and cess</u> □ |
|-------------------------------|------------------------------------|
| Up to Rs 5 lakh               | Nil                                |

|                             |  |
|-----------------------------|--|
| Rs 5,00,001 to Rs 10,00,000 | 20% of (Total income minus Rs 5,00,000) + 4% cess                  |
| Rs 10,00,001 and above      | Rs 1,00,000 + 30% of (Total income minus Rs 10,00,000) + 4% cess □ |

For Non-resident individuals (NRI), the basic exemption limit is of Rs 2.5 lakh in a financial year irrespective of their age. □ If the net income exceeds Rs 50 lakh but below Rs 1 crore, a surcharge of 10% is levied on the income tax payable before levy of cess at 4%. If the net income exceeds Rs 1 crore, then a surcharge of 15% is levied. □

Budget 2018 increased cess on income tax to 4 per cent from 3 percent earlier across the board for taxpayers. Due to the hike in cess, the tax liability for the highest slab (assuming an income of Rs 15 lakh) has increased by Rs 2,625. In the middle income tax slab, the tax outgo increases by Rs 1,125, and there is a nominal increase in the tax liability of Rs 125 for lowest income tax slab. □

Here's how much your income tax liability will be as per the proposed announcements in the budget : □

| Resident Individual below the age of 60 years |  |                    |                           |                             |
|---|--|--------------------|---------------------------|-----------------------------|
| Net Income Range                              | Income Tax Rates and CESS  | Net Taxable Income | Post Budget Tax Liability | Increase in Tax due to CESS |
| Upto Rs. 2,50,000                             | Nil  | 2,50,000           | -                         | -                           |
| Rs. 2,50,001 to Rs. 5,00,000                  | 5% of (total income minus Rs. 2,50,000) + 4% CESS                  | 5,00,000           | 13,000                    | 125                         |
| Rs. 5,00,001 to Rs. 10,00,000                 | Rs. 12,500 + 20% of (total income minus Rs. 5,00,000) + 4% CESS    | 10,00,000          | 1,17,000                  | 1,125                       |
| Rs. 10,00,001 and above                       | Rs. 1,12,500 + 30% of (total income minus Rs. 10,00,000) + 4% CESS | 15,00,000          | 2,73,000                  | 2,625                       |

| Resident Individual who is of age 60 years or above but less than 80 years |  |                    |             |                             |
|--|--|--------------------|-------------|-----------------------------|
| Net Income Range   | Income Tax Rates and CESS  | Net Taxable Income | Post Budget | Increase in Tax due to CESS |
| Upto Rs. 3,00,000  | Nil  | 3,00,000           | -           | -                           |
| Rs. 3,00,001 to Rs. 5,00,000   | 5% of (total income minus Rs. 3,00,000) + 4% CESS                  | 5,00,000           | 10,400      | 100                         |
| Rs. 5,00,001 to Rs. 10,00,000  | Rs. 10,000 + 20% of (total income minus Rs. 5,00,000) + 4% CESS    | 10,00,000          | 1,14,400    | 1,100                       |
| Rs. 10,00,001 and above  | Rs. 1,10,000 + 30% of (total income minus Rs. 10,00,000) + 4% CESS | 15,00,000          | 2,70,400    | 2,600                       |

| Resident Individual who is of the age 80 years or above |  |                    |             |                             |
|---|--|--------------------|-------------|-----------------------------|
| Net Income Range  | Income Tax Rates and CESS  | Net Taxable Income | Post Budget | Increase in Tax due to CESS |
| Upto Rs. 5,00,000                                       | Nil  | 5,00,000           |             |                             |
| Rs. 5,00,001 to Rs. 10,00,000                           | 20% of (total income minus Rs. 5,00,000) + 4% CESS                 | 10,00,000          | 1,04,000    | 1,000                       |
| Rs. 10,00,001 and above                                 | Rs. 1,00,000 + 30% of (total income minus Rs. 10,00,000) + 4% CESS | 15,00,000          | 2,60,000    | 2,500                       |

These proposals will come into effect from the assessment year 2019-20. Assessment year is the year that immediately follows the financial year. □

As per the current income tax slabs, taxation of income of resident individuals below 60 years is as follows: Income up to Rs 2.5 lakh is exempt from tax, 5 per cent tax on income between Rs 250,001 to Rs 5 lakh; 20 per cent tax on income between Rs 500,001 and Rs 10 lakh; and 30 per cent tax on income above Rs 10 lakh. □

For senior citizens (aged 60 years or above but less than 80 years), income up to Rs 3 lakh is exempt from tax. Income from Rs 300,001 to Rs 5 lakh is taxed at 5 per cent, from Rs 500,001 to Rs 10 lakh at 20 per cent and above Rs 10 lakh at 30 per cent. □

For super senior citizens, aged 80 years and above, income up to Rs 5 lakh is exempt from tax. Income from Rs 500,001 to Rs 10 lakh is taxed at 20 per cent and above Rs 10 lakh is taxed at 30 per cent. □

| RESIDENT INDIVIDUAL BELOW THE AGE OF 60 YEARS |   |                  |                                     |
|---|---|------------------|-------------------------------------|
| Net Income Range                              | Income Tax Rates                                | Education Cess   | Secondary and Higher Education Cess |
| Upto 2,50,000                                 | Nil   | Nil              | Nil                                 |
| Rs 2,50,001-Rs 5,00,000                       | 5% of (Total income - 2,50,000)                 | 2% of income tax | 1% of income tax                    |
| Rs 5,00,001-Rs 10,00,000                      | Rs 12,500 + 20% of (Total income - 5,00,000)    | 2% of income tax | 1% of income tax                    |
| Above Rs 10,00,000                            | Rs 1,12,500 + 30% of (Total income - 10,00,000) | 2% of income tax | 1% of income tax                    |

Surcharge@10% for taxable income between Rs 50 lakhs to Rs 1 Cr and @15% for taxable income > 1 Cr

| RESIDENT INDIVIDUAL 60 YEARS TO <80 YEARS |   |                  |                                     |
|---|---|------------------|-------------------------------------|
| Net Income Range                          | Income Tax Rates                                | Education Cess   | Secondary and Higher Education Cess |
| Upto 3,00,000                             | Nil   | Nil              | Nil                                 |
| Rs 3,00,001-Rs 5,00,000                   | 5% of (Total income - 3,00,000)                 | 2% of income tax | 1% of income tax                    |
| Rs 5,00,001-Rs 10,00,000                  | Rs 10,000 + 20% of (Total income - 5,00,000)    | 2% of income tax | 1% of income tax                    |
| Above Rs 10,00,000                        | Rs 1,10,000 + 30% of (Total income - 10,00,000) | 2% of income tax | 1% of income tax                    |

Surcharge@10% for taxable income between Rs 50 lakhs to Rs 1 Cr and @15% for taxable income > 1 Cr

| RESIDENT INDIVIDUAL 80 YEARS AND ABOVE |   |                  |                                     |
|--|---|------------------|-------------------------------------|
| Net Income Range                       | Income Tax Rates                                | Education Cess   | Secondary and Higher Education Cess |
| Upto 5,00,000                          | Nil   | Nil              | Nil                                 |
| Rs 5,00,001-Rs 10,00,000               | 20% of (Total income - 5,00,000)                | 2% of income tax | 1% of income tax                    |
| Above Rs 10,00,000                     | Rs 1,00,000 + 30% of (Total income - 10,00,000) | 2% of income tax | 1% of income tax                    |

Surcharge@10% for taxable income between Rs 50 lakhs to Rs 1 Cr and @15% for taxable income > 1 Cr

After taking the deductions under Section 80 (C) to 80 (U), the tax is payable after adding the cess and surcharge, if applicable. □

The education cess of 2% and secondary cess of 1% are calculated on the amount of tax payable separately. Both the cess are then added to the tax payable to arrive at the Gross tax payable amount. □

The surcharge is levied @ 15% on the amount of income tax where net income exceeds Rs 1 crore and at 10 per cent where net income exceeds Rs 50 lakh and below Rs 1 crore. In the case where the surcharge is levied, the cess will be levied on the tax amount plus surcharge. □

A resident individual can also avail rebate under Section 87(A) whose net income is equal to or less than Rs 3.5 lakh. The amount of rebate under this section is 100% of the income tax or Rs 2,500 whichever is less. It is deductible before calculating the cess.



ILTA  
Since 1950

### WHERE ARE JOBS ? DATA FAILS TO SHOW THE REAL PICTURE OF CREATING JOBS



Rejecting claims about rise in unemployment, Railway Minister Piyush Goyal said the existing methods to capture jobs data have failed to offer a real picture. The government has created enough jobs in the last five years, however, data sources were unable to adequately capture this trend, he also said at an event organized by CII.

“There is no system to collect data from unorganized sector, the self-employed and also a large section of female population who by choice do not work. Are they unemployed? There are various aspects to this that need to be looked into,” news agency PTI reported citing Piyush Goyal.

There is a key difference between the data available in the public domain and that with Employees Provident Fund Organisation (EPFO), he also said. The data needs to be made more robust in the informal sector, he noted.

He, however, noted that alternative job opportunities have surged and new sectors were encouraging self-employment, which any labour data has failed to take into account. In the run-up to the elections, the Modi government has been facing constant criticism from the opposition parties on lack of enough job creation in nearly 5 years of its rule. Clarifying on the 15 million applications received by the railways for a small number of posts, Piyush Goyal said that such data is often used to highlight high rate of unemployment.

“The attraction and lure of government jobs in the traditional Indian context is extremely huge. People think if they get a government job, they are sorted for life they are permanent and, even if they misbehave and are found to be not good at their work, it does not matter, the unions will take care of the. That is the reality,” PTI reported him saying.

(Financial Express – 16/01/2019)



**-: JILTA :-**

**Owner:** Indian Leather Technologists' Association, **Publisher & Printer:** Mr. S. D. Set, **Published From:** 'Sanjoy Bhavan', (3<sup>rd</sup> 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



# ILTA PUBLICATION

*Now available*



Title of the Book  
Treatise on Fatliquors and  
Fatliquoring of Leather

Author  
Dr. Samir Dasgupta

Price per copy\*  
₹ 1500.00 / \$ 60.00

Title of the Book  
Comprehensive  
Footwear Technology

Author  
Mr. Somenath Ganguly

Price per copy\*  
₹ 500.00 / \$ 50.00



Title of the Book  
An Introduce to the  
Principles of Leather  
Manufacture

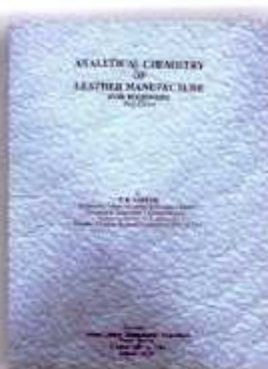
Author  
Prof. S. S. Dutta

Price per copy\*  
₹ 800.00 / \$ 50.00

Title of the Book  
Analytical Chemistry of  
Leather Manufacture

Author  
Mr. P. K. Sarkar

Price per copy\*  
₹ 300.00 / \$ 10.00



Title of the Book  
Synthetic Tanning  
Agents

Author  
Dr. Samir Dasgupta

Price per copy\*  
₹ 900.00 / \$ 30.00

Title of the Book  
Hand- Book of Tanning

Author  
Prof. B. M. Das

Price per copy\*  
₹ 750.00 / \$ 25.00



\*Packing and forwarding charge extra

Send your enquiries to :

**Indian Leather Technologists' Association**

Sanjoy Bhavan, 3rd Floor, 44, Shanti Pally, Kolkata-700 107, WB, India

Phone : 91-33-2441-3429 / 3459 Telefax : 91-33-2441-7320

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

Website : www.iltaonleather.org

# History and Activities of Indian Leather Technologists' Association

Registration No. KOL RMS/074/2019-21

The Indian Leather Technologists' Association (ILTA) was founded by Late Prof. B. M. Das, the originator of Das-Dassany theory and father of Indian Leather Science on 14<sup>th</sup> August 1950.

The primary objectives of the Indian 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 seminars, symposium, workshop in order to disseminate 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 adaptable to the industry.
- ◆ To organize practical training and to provide assistance in manpower and to motivate good students to study.
- ◆ To conduct activities related to the growth of the export of leather and leather goods from India.
- ◆ As the part of many social activities ILTA has donated Rs. 1 lac to Central General of Nepal towards relief of earthquake affected of Nepal on 17<sup>th</sup> Sept, 2015.

## INTERNATIONAL & NATIONAL SEMINAR

- ◆ ILTA is the Member Society of International Union of Leather Technologists & Chemists Societies (IULTCS), a 115 years old organization and for the first time the IULTCS Congress was organized in January 1999 outside the developed countries in Jaipur by ILTA and CUR.
- ◆ 2017 IULTCS Congress is scheduled to be held in India again.
- ◆ 8<sup>th</sup> Asian International Conference on Leather Science & Technology (AICLST) was organized by ILTA in 2010 during its Diamond Jubilee Celebration year.

## SEMINAR & SYMPOSIUM

ILTA organizes Seminar & Symposiums on regular basis to share information, knowledge & latest development and innovations for the benefit of all concerned. Few are as under:

- ◆ Prof. B. M. Das Memorial Lecture every year during the Foundation Day Celebrations on 14<sup>th</sup> August every year.
- ◆ Sanjoy Sen Memorial Lecture on 14<sup>th</sup> January every year, the birthday of our late President for several decades.
- ◆ Prof. M. B. Banerjee Memorial Lecture on 15<sup>th</sup> March every year, the birthday of this iconic personality.
- ◆ Seminar on the occasion of India International Summer Fair (IISF) at Chennai in February every year.

## IT HAS ALSO ORGANIZED:

- ◆ Prof. Y. Nayudamma Memorial Lecture.
- ◆ Series of Lectures during "Programme on Emerging & Sustainable Technologies (PREST)".
- ◆ Seminars in occasion of India International Leather Fair, 2014 and 2015 at Chennai etc. Many reputed scientists, industrialists and educators have delivered these prestigious lectures. Foreign dignitaries during their visits to India have addressed the members of ILTA on various times.

## PUBLICATION

ILTA have published the following books:

- ◆ An Introduction to the Principles of Physical Testing of Leather by Prof. S. S. Dutta
- ◆ Practical Aspects of Manufacture of Upper Leather by J. M. Dey
- ◆ An Introduction to the Principles of Leather Manufacture by Prof. S. S. Dutta
- ◆ Analytical Chemistry of Leather Manufacture by P. K. Sarker
- ◆ Comprehensive Footwear Technology by Mr. Somnath Ganguly
- ◆ Treatise on Polishing and Polishing of Leather by Dr. Sanjay Dasgupta
- ◆ Synthetic Tanning Agents by Dr. Sanjay Dasgupta
- ◆ Hand Book of Tanning by Prof. B. M. Das

ILTA has a good Library & Archive enriched with a few Important Books, Periodicals, Journals etc.

## AWARDS OF EXCELLENCE

- ◆ ILTA awards Prof. B. M. Das Memorial, Sanjoy Sen Memorial, J. M. Dey Memorial and M. B. Banerjee Memorial Medals to the top rankers at the University / Technical Institute graduate and post graduate levels to encourage the brilliant to excel with the industry.
- ◆ 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 (ILTA).

## LEXP0:

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 1982 and Durgapur from 2010, to help the big, cottage and small-scale sectors industries in marketing, LEXPO helps give 200 exposure for their products. Apart from Kolkata, Siliguri & Durgapur, ILTA has organized LEXPO at Bhubaneswar, Gangtok, Guwahati, Jamshedpur and Ranchi.

## MEMBERS

The Association's present (as on 31.03.2018) strength of members is more than 600 from all over India and abroad. Primarily the members are leather technologists passed out from Govt. College of Engineering & Leather Technology, Anna University, Chennai, Harcourt Butler Technological Institute, Kanpur, B. P. Airodker National Institute of Technology, Jabalpur and Scientists from Central Leather Research Institute.

## ESTABLISHMENTS

In order to strengthen its activities, ILTA has constructed its own six stories building at 44, Shanti Pally, Kestop, Kolkata - 700 107 and have named it "Sanjoy Bhavan".

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



**68 YEARS OF SERVICE TO THE INTERNATIONAL LEATHER FRATERNITY**



ILTA  
Since 1950

**Indian Leather Technologists' Association**

[A Member Society of International Union of Leather Technologists' and Chemists Societies (IULTCS)]

"Sanjoy Bhavan", 3rd Floor, 44, Shanti Pally, Kolkata- 700 107, WB, India

Phone : 91-33-2441-3429 / 3459 Telefax : 91-33-2441-7320

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

Website : www.iltaonleather.org