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Since 1950

Portfolio

JOURNAL OF INDIAN LEATHER TECHNOLOGISTS' ASSOCIATION (JILTA)

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

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

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Global financial Shockwaves – The Remembrance

Ten years ago this month the initial shocks started to appear across several organisations, banks, financial service firms and market regulators. The global financial crisis, which is believed to have lasted from mid 2007 to late 2009, was the worst and biggest credit crunch since the great depression of the 1930s. For most of the Americans, the financial crisis marked a heavy damage ranging from job losses to the collapse of the economy. In March 2009, most of the global stock markets plummeted to the levels last seen three years before it. In October 2009, the unemployment rate in the United States rose to 10% for the first time since 1982. We take a look at the key events that told the world that there is a crisis going on.

The early shockwaves developed in between February to July 2007. The initial signs of troubles were mostly missed by various stakeholders in the financial system. In February, Freddie Mac — the American federal home loan mortgage company — announced that it would no longer buy riskiest subprime mortgages and mortgage-related securities. In April, New Century Financial Corp, one of the leading subprime mortgage lenders, filed for bankruptcy. The leading credit research firms, Standard and Poor's and Moody's Investor Services downgraded over 100 bonds backed subprime mortgages in June. However, in the same month, the Federal Open Market Committee (FOMC) voted to maintain its target for the US Federal Reserve's key policy rate at 5.25%.

Bear Stearns, one of the top investment banks in the US, informed investors that it would suspend redemptions from a fund investing in subprime bonds. Following this, Standard and Poor's placed 612 securities backed by subprime residential mortgages on a credit watch. Meanwhile, insurance company Countrywide Financial Corp warned of "difficult conditions". Later, American Home Mortgage Investment Corp filed for bankruptcy in July.

Another trouble struck the financial markets when France's largest bank BNP Paribas halted redemptions on three of its investment funds. The bank said it had not valued the underlying assets of the CDO (collateralised debt obligations) instruments. The subprime assets on which the so-called CDOs were made became worthless when borrowers defaulted. Amid all this, the FOMC still voted to maintain its target for the US Fed's policy rate at 5.25%.

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The UK's Chancellor of the Exchequer authorised Bank of England to provide liquidity support for Northern Rock — the country's fifth-largest mortgage lender. The credit crunch hit with full force when Northern Rock suffered the first run on a British bank since 1866. After two failed takeover offers, and with the continuing weakness in the financial system, Northern Rock was taken under state ownership by the Treasury of the United Kingdom in February 2008.

Memorabilia:

September 2007: The FOMC voted to reduce its target for the US Federal Reserve's policy rate by 50 basis points to 4.75%.

October 2007: The FOMC again voted to cut its target for the federal Reserve's rate by 25 basis points to 4.5%.

December 2007: The FOMC recommended yet another rate cut, voting to reduce its target for the Federal Reserve's policy rate by 25 basis points to 4.25%.

January 2008: Meanwhile, Bank of America announced that it would purchase Countrywide Financial in an all-stock transaction worth approximately \$4 billion. FOMC moved quickly, and in its continuing efforts to spur lending, it voted to reduce its target for the US Fed's

policy rate by a huge 75 basis points to 3.5%. Again in the same month, FOMC voted to reduce its target for the Fed rate by another 50 basis points to 3%.

President George W Bush signed the Economic Stimulus Act of 2008 into law in February 2008. Following this, in March 2008, the Federal Reserve Board announced the creation of Term Securities Lending Facility (TSLF), which would lend up to \$200 billion of Treasury securities for 28-day terms against federal agency debt, federal agency residential mortgage-backed securities (MBS). In the same month, the FOMC voted to reduce its target for the US Fed's key policy rate by 75 basis points to 2.25%.

Global investment bank Bear Stearns was highly active in the securitisation process and had issued a large number of asset-backed securities. The Federal Reserve Bank of New York announced that it would provide term financing to facilitate JPMorgan's acquisition of The Bear Stearns Companies Inc. The Federal Reserve was afraid that the trillions of dollars on Bear Stearns' balance sheet would become worthless and could possibly spark a global panic, if it does not step in. Bear Stearns was bought by JPMorgan for \$240 million — for a price of a measly \$2 per share on 14 March 2008.

A short breather:

April 2008: FOMC voted to reduce its target for the US Fed's policy rate 25 basis points to 2%. Meanwhile, the International Monetary Fund (IMF) also predicted potential losses in the trillions of dollars.

June 2008: FOMC voted to keep its target for the US Federal Reserve's interest rate at 2%.

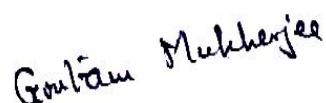
July 2008: The Securities Exchange Commission (SEC) issued an emergency order temporarily prohibiting naked short-selling in the securities of Fannie Mae, Freddie Mac, and primary dealers at commercial and investment banks.

August 2008: The FOMC again voted to maintain its target for the US Fed's key policy rate at 2%.

Difficulties started surfacing at giant US government-backed mortgage buyers Fannie Mae and Freddie Mac. The Federal Housing Finance Agency (FHFA) placed Fannie Mae and Freddie Mac in government conservatorship. By 7 September 2008, the US government was forced to bail out the two entities.

For many, the bugle of the global financial crisis was sounded by the fall of the United States' fourth largest investment bank Lehman Brothers. In September, Bank of America announced its intent to purchase Merrill Lynch & Co for \$50 billion. Later in the day, the unimaginable happened as Lehman Brothers filed for bankruptcy after potential buyers walk out of the deal. The panic was at a high throughout the world markets, especially as Lehman Brothers had assets worth \$639 billion, which were inter-dependable on other major banks too.

The very next day the Federal Reserve was forced into an \$85 billion bailout of the American International Group (AIG). On its part, the SEC announced a temporary ban on short selling on all of the financial sector stocks. The FOMC voted to maintain its target for the US Federal Reserve's key policy rate at 2%.


Dr. Goutam Mukherjee
Hon. Editor, JILTA

From the Desk of General Secretary

67th Foundation Day Celebration

Above was organized at the Auditorium of Freya Design Studio, Kolkata Leather Complex on Monday the 14th August, 2017.

The programme commenced with Mr. Susanta Mallick, General Secretary, ILTA requesting the following dignitaries to please take their seats on the dias –

- 1) Mr. Arnab Jha, President, ILTA
- 2) Dr. B. Chandrasekaran, Director, CSIR – CLRI, Chennai
- 3) Dr. Kalyan Rudra, Hon'ble Chairman, West Bengal Pollution Control Board
- 4) Mr. Imran Ahmed Khan, General Secretary, CLCTA

Dr. B. Chandrasekaran was presented a bouquet by Mr. Arnab Jha, President, ILTA.

Dr. Kalyan Rudra was greeted with a bouquet by Dr. Sanjoy Chakraborty, Principal, Govt. College of Engineering & Leather Technology, Kolkata.

Mr. Imran Ahmed Khan was greeted with a bouquet by Mr. B. C. Jana, Executive Committee Member, ILTA.

Mr. Mallick, then requested Mr. Arnab Jha to deliver his welcome address.

Highlighting the immense contribution of Prof. B. M. Das, our founder President for Leather Science and the industry, the president in his address elaborated how successfully ILTA jointly with CSIR – CLRI organized IULTCS Congress XXXIV at Chennai from 5th to 8th February, 2017.

The portrait of late Prof. B. M. Das was then garlanded by the following :-

- 1) Mr. Arnab Jha, President, ILTA
- 2) Dr. B. Chandrasekaran
- 3) Dr. Kalyan Rudra
- 4) Mr. Imran Ahmed Khan

- 5) Mr. Smritimoy Dey, a senior member of ILTA

- 6) Mr. Arijit Chakraborty, representative from GCELT

- 7) Mr. Soumik Halder, representative from CFTC, Budge Budge

- 8) Dr. Dipankar Choudhuri, representative from RCED, CLRI, Kolkata

- 9) Mr. Zia Nafis, representative from Industry & Jt. Secretary, CLCTA

- 10) Dr. A. B. Mondal, Ex-Director, CSIR – CLRI, Chennai

- 11) Representative from FDDI, Kolkata

Dr. A. B. Mondal, Ex-Director, CSIR – CLRI, Chennai & Mr. Jia Nafis, Joint Secretary, CLCTA were then greeted with flower bouquets.

Dr. B. Chandrasekaran, the Chief Guest then addressed the gathering which was followed by address of Mr. Imran Ahmed Khan, the Guest of Honour.

President, ILTA then introduced Dr. Kalyan Rudra to the gathering and requested him to deliver B. M. Das Memorial Lecture titled **"Longitudinal Disconnectivity, Diminishing Flow and Pollution Management of the Ganga"**.

Dr. Rudra was presented a Memento by Mr. Susanta Mallick after the lecture.

After giving thanks to Dr. Rudra for his extremely interesting lecture, G.S. mentioned that every year on this day ILTA presents different awards to motivate and appreciate the students and authors of Articles on Leather & Footwear Science covering almost all the Institutions where diploma / degree / post graduate courses on Leather & Footwear Science are running. G.S. then announced the names of the award winners and requested them to come to the dias to receive their awards.

- a) Mr. N. Prashanth – Winner of B. M. Das Memorial Medal for securing 1st Class 1st Position in B.Tech, Leather Technology examination of Anna University in 2017 received the award from Mr. Arnab Jha.



- b) Miss Hema Nagalakshmi – Winner of B. M. Das Memorial Medal for securing 1st Class 1st Position in M.Tech, Leather Technology examination of Anna University in 2017 received the award from Dr. B. Chandrasekaran.
- c) Mr. C. M. Rajesh – Winner of B. M. Das Memorial Medal for securing 1st Class 1st Position in M.Tech, Footwear Science & Engineering examination of Anna University in 2017 received the award from Dr. Kalyan Rudra.
- d) Mr. Santosh Kr. Mukherjee – Winner of B. M. Das Memorial Medal for securing 1st Class 1st Position in M.Tech, Leather Technology examination of Moulana Abul Kalam Azad University of Technology, West Bengal in 2016 received the award from Mr. Imran Ahmed Khan.
- e) Mr. Sourav Sarkar – Winner of both B. M. Das Memorial Medal & J. M. Dey Memorial Medal for securing 1st class 1st position in B.Tech, Leather Technology examination of Moulana Abul Kalam Azad University of Technology, West Bengal in 2017. Sri Sarkar's father received the awards from Mr. Arnab Jha and Dr. Sanjoy Chakraborty respectively, Sri Sarkar having been away to Chennai.
- f) Prof. Dr. E. H. A. Nashy – Winner of J. Sinha Roy Memorial Award for his article titled "Bio-Technology in Leather Industry" published in Oct, Nov & Dec, 2016 issues of JILTA adjudged the Best of all articles published in JILTA in calendar

year 2016 by a committee consisting of Dr. Sanjoy Chakraborty, Principal, GCELT and Dr. Dipankar Chaudhuri, Scientist & Head, RCED, CLRI, Kolkata.

Since the author is Egypt based, the award will be forwarded to him by air mail.

Mr. Susanta Mallick, General Secretary, ILTA then offered Vote of Thanks.

While giving thanks, Mr. Mallick expressed gratitude to the industry for their presence today and wished bright future for the award winners. He concluded the programme after remembering those dedicated members who contributed for the successful journey of our Association in the last six and a half decades.

After completion of the programme, lunch was served to all participants.

The 67th Foundation Day Celebration was a grand success with overwhelming support of 190 participants from industry, our members, lecturers & students from GCELT, CFTC, FDDI and members of ILPA & CLCTA.

59th Annual General Meeting

Due to non-receipt on time audited statement of accounts of the Southern Region for the F.Y. 2016-2017, the 59th AGM could not be organized within September, 2017. Efforts are on to see that the AGM is arranged within October, 2017.

An Appeal

Shri Subal Kumar Das, a student of GCELT during the session 1990 – 94 and a member of ILTA till 4 years ago was found some 3/4 months ago to have been suffering from cancer.

With his own resources and financial help received from other sources, treatment has already commenced but is unlikely to continue unless immediate more financial help is received. Shri Das appealed to ILTA for such help.

We appeal to all our Members to extend a helping hand and forward urgently whatever financial help is possible to the Bank Account of either Shri Subal Kumar Das or that of Alumni Association, GCELT, details of which are given below.

Bank Account details of Shri Subal Kumar Das

A/c holder's Name : Subal Kumar Das / Sampa Das
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Branch Name : Dharam Pukuria,
North 24 Parganas,
PIN – 743 235
Branch Code : 007004
Account No. : 33587824025
IFSC / NEFT Code : SBIN0007004
MICR Code : 743002235

Bank Account details of Alumni Association of GCELT

A/c holder's Name : Alumni Association of GCELT
Bank Name : Corporation Bank
Branch Name : Kolkata – NUJS Campus,
Salt Lake City,
Kolkata – 700 098
Branch Code : 000663
Account No. : 007226
IFSC / NEFT Code : CORP0000663
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(Susanta Mallick)
General Secretary



You are requested to :-

- a) Kindly inform us your '**E-Mail ID**', '**Mobile No**', '**Phone No**', through E-Mail ID: admin@iltasonleather.org or over Telephone Nos. : 24413459 / 3429 / 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.

**Executive Committee Members meet every Thursday
at 18-30 hrs. at ILTA Office.
Members willing to participate are most welcome.**



Balmer Lawrie Corner



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Emerging Trend in Fashion for Leather

Mr. Sabyasachi Sengupta * Associate Professor & **Mr. Rahul Sethi** Associate Professor

NATIONAL INSTITUTE OF FASHION TECHNOLOGY, KOLKATA

Key words: Anga, Vanga, Kalinga, Textiles, Society

Introduction:

Anga-Vanga-Kalinga – a chord that was built upon spinning and twisting many tales from mythology and history passing through the pre-modern period (till 1000 CE) got them placed as lively and polychromatic in various academic discourses. Apart from Kashi, Kanchi, Kosha, or Magadha these three names were always spelled together to narrate many common factors that were mostly associated with the socio-political and cultural scenarios of eastern part of this subcontinent. While retaining their individual characteristics, these three geographical spaces had developed a syntactical familiarity in socio-economic norms, arts and crafts that were primarily based upon culture, as well as in other livelihood guidelines and the most prominent visual accord was established in their dress senses. Since the mythic discourses, these individual societal identities that had originated from this geo-space, from community narratives of birth-marriage-death, merry-making and religious festivals or pala-parvanas through the seasons in the sun and winds of the expanses, a kinship that was built upon a grand old Gene-Code of the mythic saint dirghatamah still bears that common factor in weaving-embroidery-clothing life. The moment we see Saree, Gamchha (gamochha), dhuti (dhoti) we ought to find a milieu still carrying the lifeline of that very gene. Time has engulfed many customs and cultures; cities and towns have tainted their ethos, yet the marginal of villages and hamlets have retained this unison. In terms of design, aesthetics and crafts, one has inspired and adopted the other, never had experienced any slippage from the orbital journey of clothing and appurtenances. On the other hand, leaving the fetish of synthetic materials, gold and diamonds, now cities have slowly started accepting the uniqueness of Katki, Bhagalpuri, Shantipuri, Pipli, Dhokra, Kantha and many other indigenous make-ups. The cities have understood the traditional definition of beauty and aesthetics. For thousands of years, 'fashion and style' that was built upon different looms, literature, paintings and stone carvings is powerful enough to bring back certain lost habits.

As mentioned, since time immemorial, linguistic closeness (all three being Indo-European speech family members), food habits, and many other customs unified these three spaces. The presence of this dynamic setting can further be established from the documents and huge archival records of weaving, embroidery works and clothing, decorating them in an evocative way to substantiate their artistic dexterity. Dress being one of the few important visual and societal communication markers, conceivably after speech, is the oldest way to justify one community's bearing on culture and climate. A detailed diachronic study on social sciences, linguistics and history of weaving-embroidery-dress of the then marginal, subalterns and the mass that remained unseen by the academy would definitely connect to certain missing links of many purest expressions.

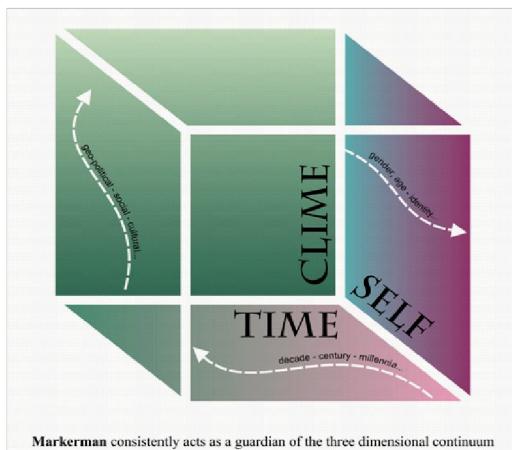
The Markerman of the Fashion-Style discourse :

Dress is the important human Marker (Identifier). And the Markerman consistently acts as a guardian of a three dimensional continuum taking responses from the riddles of 'may be-must be-may not be'. Ever since the race stepped out from the caves, it acts as the sentinel to 'our -your - their' ways of looking to the mind to the material and to appreciate beauty. The continuum consists of three dimensions which can be termed as Clime, Self, and Time. These three dimensions are well-built by their own definitions as well as each one complementing the other.

Keeping Clime as the first dimension; we can integrate geographical, political and geo-cultural identities as stipulated by clothes and dressing-up into this genus. Goopy and Bagha have to change themselves up while making fantastic journeys from Hundu to Shundi via Jhundi (in order to coping up with extreme climatic conditions) in Goopy Gayen Bagha Bayen, (Ray, Satyajit, Adventures of Goopy and Bagha, 1969). Likely, it is also found, clothes do change with each foreign visit a statesman makes. Muslin changes with each export; Nokshi kantha rests on a mummy (eisamay app, 2016). The second dimension is Self which can be filled up by sex, age, socio-economics, and many other politico-cultural

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identities. The two good marginal fellas from Amloki and Hartaki villages (Goopy and Bagha) need to change their clothes the moment they were promised two daughters (princesses) of the Kings as their brides; Society forever remains euphoric if not amused with her clothes that she herself propels. From the dressing of Shikhandi to the disguise of Chitrangada and Vrihannala (Mahabharata) to the modern drag kings and queens gender senses put queer theories of Self in respect to one's owned clothes. Festival moods seek utopia, wars invite dystopia, and nonetheless the stolid Markerman keeps on documenting these realistic scores. Following Clime and Self the moment we need to elucidate the third dimension, the dimension that takes care of relativity, builds up the dynamic cube comprising of three dimensions is Time. It is observed, surpassing decades, centuries and millennia that the grand old Time has grown up with really complex stalks. Clothes change from Job Charnock to Steve Jobs, clothes change from Jessie Owens to Usain Bolt. Time shows us that same Shikhandi (Mahabharata) transforms into drag king or queen, thus builds up an ever changing narrative called Clime-Self-Time.



The body and brain diad encompasses etiquettes of that very Clime-Self-Time. With time passing by aesthetic, social and state judgments change where men and women build up their individual clothing spaces. From time to time territories, societies, and states stipulate, 'Be on your mark and dare not cross the line that surely would invite coercion'. Style would be happy in its own space, but it is rather amusing to see fashion crossing the emotive line of control time and again. The Markerman is indeed merciless. Whatever is left in the essay triggers out a shock – it is at this moment the language of films needs to be introduced. If Modesty comes can immodesty be far behind!

Tagore, Ray and other semiotics of clothing :

Like ever-shifting culinary tastes of a race in duress (annochinta chamatkara - fascinating thrive for fooding, Ramakrisna Kathamrita), with each of the passing decades, dressing-up is also found to be following that Orphean gaze and performs amongst a given community. From the very first recognition of one's Self standing and babbling in front of the mirror as a growing up child develops a bond with flesh and brain that lasts till his death. The child grows up to a boy, at times becomes cynical about his choices to his already marginalized father "ki posakh aniyacho kine" (hope, you've bought clothes keeping the latest fashion in mind? - Pujar saaj, Tagore). He grows beard and moustache, his voice begins to adulterate, attains adolescence, time takes care of this journey. Tall, short, portly, lanky whatever it might be, Tagore provides a solution to the eternal question of the layers that make up the bodily aesthetics and psychology. "... Kshiti says, 'tell me honestly, will Byyom ever appear to be better in a well dressed manner? If an elephant be gifted with plumes like a peacock would it be smarter; equally, the peacock would not be looking nicer wagging an elephant's tail – our Byyom will not be superior if he dresses like Sameer, likewise, Sameer, surely would be a misfit here in Byyom's attire.' ..." (Bhadrotar adorsho, panchabhat, shravana, 1302). Thus we get to know that fashion-style linguo-cultural 'timelets' do inhabit within time. Clothing is more of a language space, a wrapper, with the layers of Syntax-Morphology-Phonology-Phonemics it makes its way to morphemes-phonemes-phones and rests decoding and encoding the narratives of built up signifiers and signifieds — own semiotics constructed upon various theories of arts, crafts and social sciences. Saussure, Barthes, and Eco et al have directed different ways to look at the fashion-clothing crossroad. It can also be deciphered through the looking glass of cultureme. We must bring Tagore's lucid clarification from shesher kobita (Farewell Song – Tagore) here. He writes, 'Amit believes, fashion is that mask which veils the style of the facial countenance... one may get exited seeing a professional nautch girl from behind the curtains in a public merry making tent, but the Banarsi veil is a must to appreciate one's bride for the first time. That curtain remains a mere totem called fashion; the Banarsi veil defines the style – seeing the exclusive face through the shadow of an extraordinary hue. ... the tales from dakshayajna (Lord Shiva's vigorous dance) exemplifies this quite graphically; Indra, Chandra, Varuna were very fashionable gods and they got invited in each sacrificial ceremony, except Shiva whose style

was so very original, the chanting priests did find him very unusual to present him gifts..."(Shesher Kabita, 1928)

Anga, Vanga and Kalinga

Anga, Vanga and Kalinga are the three siblings along with Pundra and Sumva; According to the tales from Matsa Purana and Adiparva upon the request of Maharaja Bali to an old-blind saint, Rishi Dirghatamaah, Rani Sudeshna gave birth to children who later on coroneted to one Desha each under their respective names. Albeit, these Deshas were declared forbidden – any pilgrim was prohibited to visit these deshas: 'Anga, vanga, kalingeshu sourastre magadheh api cha; tirthayatraam vina gacchan punah samskaramarHati.' If one dare visit these deshas penance will be the only solution. The turbulent Buddhist-Jainist flow in the east could have been a reason for this sanction (Dinesh Chandra Sen). Mostly, because of geo-cultural and linguistic intimacy, these siblings had countless common practices. Apart from food habits, religious and social practices, construction of dwellings and their clothing, various customs from cooking utensils to coiffure pins, from reddening agents of the beetle leaves to the wedding sarees, from ulu (the sacred non-verbal sound made with tongue by married women) to the sacred bell-metals, everywhere the siblings left a common ground to declare their oneness. Albeit, at the present time-space conundrum, imports from urban nuances like neo-aesthetics and amalgamated technology debris have enough 'litter' to deposit in this space. Each day this rural conformist space suffers loss of different crafts, artistic customs, and art making methodologies and so on. This slow ceasing is a truth but at the same time tat is still not very much visible in these distant lands.

The original form of Anga (angeshu gangaataTe bahishchampayah – danDi) could be traced back to the presnt Begusarai, Bhagalpur, Purnia, Munger, Katihar, Jamui, Deoghar of Jharkhand, Godda and Sahebganj in Bihar and northern Dinajpur as Malda of West Bengal. The silk sarees and yardages of Bhagalpur still embrace the natural beauty of the Unrefined and carry their pride as natural produce. On both banks of the Ganges, in Bihar, indigo, muslin and other yardages, turban and sarees that were made here supplied to different places of the subcontinent. A hale and hearty inland business went on in the courses of the Ganges. In 1720 the first factory was built in Patna; Calico and Silk Markets were established. Soon after a decade or so during the 1769-70 epidemic famine ('... all through the stifling summer of 1770 the people went on dying. The husbandmen sold

their cattle; they sold their implements of agriculture... sold their sons and daughters ... they eat grass of the field...' W.W.Hunter), Company's stern economic policies, more emphasis on the need for co-ordination had stripped off the weaving industry in this vast region. In addition to the weaving, since the Gupta era, the demand for Nezak (who used to tan the clothes first), and the need for Rajak (color artist) were at the peak in this region. Apart from that, till 1900-10 the works of Appliquéd on cotton cloth were unique until the import of bilaaiti yarns for this work that had contaminated the entire indigenous technique. The Khadi crafts are still proud of beautiful baonbuti saree (bootidar) of Bihar Sharif at Nalanda that were comprised of decorative motifs of fish, birds, conch, peacock, mosque in the selvedges. Motia, Laldhaye, and Maldehi saree are still produced for different customers with different tastes. Apart from the immense popularity of bufftas (Tasar-cotton), Safta (Malberi-Cotton) and Andi (cotton-satara) sarees, the work of Khatoya Appliquéd and Sujni works of great art and are still popular all over the country.

The word 'Vanga' synonymous to Cotton (Bandhyapadhyaya, Haricharan, Bangiya Shabdokosh,) defines the land as fertile with abundant cotton plantations. Anga, Kalinga, and Vanga or the present day's Bihar, Odisha and parts of West Bengal respectively were born to this fertility. The original limit of Vanga (brihat) was that of Gangstrotontaraa (Raghuvanbansham) or Gangaridai as noted by ancient Greco-Roman writers. It is said that it lied between the vast area of the southern basin of the Ganges (from Maldar Bhagirathi to Hooghy in the Bay of Bengal), the Himalayas (Eastern) in the north Sundarbans (Dandbhukti and Harikela) in the south, the Arakan in the east and the Bihar in the west. Nearly after thousands of years, from the days of Ptolemy wrapping Nokshi Kantha and Muslin to most of the Europoean travelers and royals, Vanga finds Chandraketugarh, presently in 24 Parganas telling many tales. When we start remembering simple yet intelligent sermons of Khanaa, the great foreseer from Chandraketugarh (8th CE to 12th CE) we get to know that the fertility of the soil, splendor of the alluvial silt by the Ganga deltaic basin gifted the best of Bengal textiles during that time. In addition to cotton, silk, jute, even fabrics from banana leaves and stalks were used for the fabric making – the brilliant hand works of the weavers attracted buyers from all over the world. From 1600 CE onward, with the arrival of the Armenians, Dutch, Portuguese, French and finally English solidified the importance and excellence of fabrics. '...Oriental hyperbole which designates the

Dacca muslins as webs of woven wind (bakt hawa) seems only moderately poetical ... Sir Charles Wilkins brought a specimen of Dacca muslin from India in the year 1786, which was presented to him by the principal of the East India Company's factory at Dacca, as the finest then made there. Robert Orme [1728–1801] Historical Fragments of the Mogul Empire) The main centres were Dhaka, Sonargaon, Murshidabad, Malda, Dhonekhali, Nadia, Shantipore, Fulia and 'Kalikata' which also had certain to the Paikaars and Gomostha and practice of Dadon and other fatalistic tax systems. Some brilliant artistic patterns found in these sarees and fabrics - dure paars, bhumra paar, pineapple paar, gangajali, thousand beads, watermelon motifs, Begumbahar etc. Apart from Malamal, Jamdani, Baluchari, Swarnachari, Pittambori, Hiramkanthi, Dhupchaya have shown the magic of the silk here. Nakshi Kantha brings back the memory of Sujni and Munger's chain-stitch. Kalinga has owned the weaving livelihood by giving it a name like Vanga. '...Oriental hyperbole which designates the Dacca muslins as webs of woven wind (bakt hawa) seems only moderately poetical ... Sir Charles Wilkins brought a specimen of Dacca muslin from India in the year 1786, which was presented to him by the principal of the East India Company's factory at Dacca, as the finest then made there. Robert Orme [1728–1801] Historical Fragments of the Mogul Empire)

The word Kalinga is derived from Tamil 'Klinga' (Textile) and its etymological meaning endorses the textile practices. From the mythic Suvarnarekha to the north of Karnat it had three broad divisions – Trikalinga, Utkalinga and Tailanga or Telinga. Since the Maratha invasion of 1750, the beauty of silk and thread work that were worthy or the lace (gold and silver) got decreased. In today's Sundargarh, Ballangir, Kalahandi, Sambalpur, Mayurbhanj, Puri, Konark, Balasore, millions of artists have been earning their sustenance working in the weaving industry. Textile industry continues to flourish even today in various centres near Puri, Pipili, Nuyapatna, Baragarh, Barpali, Sambalpur, Sanpur. Banda / Bandha (Ikkat / Double Ikkat), Applique, Pittalam, Back-Strap Loom Saree, Gamcha, Chaddar (Shawl), Ikkat Lungi are still woven following that tradition. In 1054, the Maharaja Virkishore appointed many tailors Birbhum to stitch banners and ensigns of the Jagannath Temple.

The moment we look for that Midas touch of the match that had derived from that grand old gene, thousands of information comes alive. Down the history of Aryavarta – the impacts of Mauryas, the Guptas, and

later the Tughlaqs, Lodhis and further through the acumen of Mughal Karkhanas (Large halls are seen in many places, called Kar-kanays or workshops for the artisans. In one hall embroiders are busily employed, superintended my masters In another you see the goldsmiths, in a third painters, The artisans repair every morning to their respective Kar-kanays..." Travels in Mughal Empire, Francois Bernier) or even by the domestic Excalibur these millions of offspring had a life circling the triad called – weaving – embroidery – dressing. Like every other Indian provinces, they continued worshiping this form of beauty. There is no break from it even today. Since the ancient times, the continuous artistry of Block, Aazrakh, Kalamakari, 'Parmeshwar, Pochedi, Bandhani, 'Kalahasti', 'Brocade' 'Butidhar, 'Ikkat', 'Patola' ', 'Fulkari ', 'Chambba Rumal' Kashmiri needle work are going on tirelessly. This 'weaving-embroidery-dressing' has become one of the most important means of living throughout the world. Since the ancient period of time this practice keeps on telling the rocky civilization about the soft sustenance; tells that 'protection - shame - decoration' is The Meaning. In this very practice lie the seeds of the journey of human life and will be carried out in future. Today, the textile mills are producing finest of the fabrics but in the other side of the spectrum millions of people of Bihar-Bangla-Odisha are now in the working together to continue their kinship in the name of textile akhara.

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Press release



Stahl officially launches Sustainable Leather Campaign at ACLE

Waalwijk, August 28, 2017 – As market leader in specialty chemicals, Stahl is determined to create a more sustainable leather supply chain. To support that ambition, the Dutchbased company will launch its Sustainable Leather Campaign at ACLE in Shanghai. With this campaign Stahl shows how they can help tanners and brands to create more sustainable leather by tackling production steps throughout the supply chain. Headlining the campaign are Proviera® - Probiotics for Leather™, Stahl EasyWhite Tan™ and Stahl Neo. From beamhouse to finish, these three solutions contribute to a better future for the industry.

"ACLE is known as the premier event for international leather companies," Michael Costello, Director of Sustainability at Stahl says. "That is why we decided to launch our Sustainable Leather Campaign in Shanghai. The campaign once again showcases our commitment to create a more sustainable supply chain for the leather industry. From Beamhouse to finish, with Proviera® - Probiotics for Leather™, Stahl EasyWhite Tan™ and Stahl Neo we are able to create a more sustainable leather making process together with our partners." Stahl offers a unique portfolio to enable tanners to make their

products more sustainable. It starts at the beginning of the chain in the beamhouse. Preparing hides for tanning in a more sustainable way, Proviera® - Probiotics for Leather™ reduces the wastewater that comes from beamhouse systems and replaces traditional leather chemicals with 100% natural products. To revolutionize the second stage in the supply chain, tanning, Stahl offers Stahl EasyWhite Tan™. This leather tanning system for the creation of chrome-free leather uses 40% less water during tanning and the salt in the wastewater is reduced by at least 80%. At the end of the leather making process, Stahl offers an extensive leather finish portfolio, called Stahl Neo, which is free of all substances listed on the ZDHC MRSI version 1.1. Stahl's Sustainable Leather Campaign shows that creating a better future is as easy as one-twothree with Proviera® - Probiotics for Leather™, Stahl EasyWhite Tan™ and Stahl Neo .

Visit Stahl at ACLE

Visit the Stahl stand at ACLE for more information about Stahl's sustainable solutions for leather.

The Stahl stand is located in hall E3, stand B07.





Leather Finish update

At Stahl, we are continuously looking for ways to achieve a more sustainable leather supply chain. Our Leather Finish portfolio has been expanded recently with solutions that fully comply with the 2020 ZDHC MRSList goals or even exceed this standard. Our latest additions include a new range of Water Repellents that are both PFC-free and BTX-free. We have also developed a new portfolio of Milling Chemicals and a complete range of Upgrading Solutions. The highlights of our recent innovations in brief:

Milling Chemicals

Our new range of Milling Chemicals add value and give leather items an unrivaled feel. Our solutions optimize the dry milling process and enable tanners to upgrade the leather quality to be used for bags, belts, shoes, garments and furniture. Furthermore, these products provide different effects such as softening, pull-up effect, milling effect and other special finishes. Possible applications for Stahl's Milling Chemicals vary from all kinds of tanning and retanning to final feel agents and softeners for finished leather. Most Milling Chemicals are part of our Stahl Neo portfolio of compliant and sustainable leather finishes. These products not only already comply with the Zero Discharge of Hazardous Chemicals (ZDHC) Manufacturing Restricted Substances List (MRSList), but even go beyond this standard, targeting an even wider range of chemical substances.

Upgrading Solutions

High-quality raw material is becoming increasingly difficult to source as consumers and brands increasingly ask for premium leather. We have developed a complete range of

Upgrading Solutions for leather that enables tanners and manufacturers to improve leather quality. Products are divided into three easy-to-use categories applicable from high to medium and fine upgrading needs. Stahl's Aquabase, Melio® Ground and Mirage® solutions mask grain defects and increase the usable surface area, resulting in a higher cutting yield. The result is smooth, fashionable leather with a natural feel and long-lasting elegance. All solutions meet the 2020 ZDHC MRSList goals. The majority of products even go beyond these guidelines and are part of the Stahl Neo leather finish portfolio.

Water Repellents

With our PFC-free and BTX-free water-repellent solutions we bring product innovation to the leather industry. We are proud to introduce in the market our new line of water repellents for leather that are PFC-free (Perfluorocarbon) and BTX-free (benzene toluene xylene). This new technology ensures that leather items such as footwear and hiking gear are able to withstand outdoor conditions like rain, water and snow without compromising on performance and ensuring low impact for the environment. The waterproofing solutions are easy to use and can be applied by any conventional method in pre-coats and top coats. Moreover, our water-proofing solutions are Stahl Neo certified.

Visit Stahl at ACLE

Do you want to know more? Visit the Stahl stand at ACLE for more information. Our technical experts are glad to talk with you about our novelties for leather production. You can find our stand in hall E3, stand B07.



About Stahl

Stahl is leading in process chemicals for leather products, performance coatings and Polymers. We offer a wide range of solutions to the automotive, apparel & accessories, home furnishing and leisure & lifestyle industry and for industrial applications. With more than 1,800 employees in 24 countries at 13 manufacturing sites and 38 laboratories, Stahl realized in 2016 an annual turnover of over 650 million euro. With its innovation power, expertise and range of technical solutions Stahl is able to deliver best in class solutions and services to respond even better to client needs and secure a more sustainable future.

Waste Audit – Model & Case Study

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Abstract :

The purpose of a waste audit is to gain a detailed understanding of the types and weights of material being generated. Audit results are used to improve the economic and environmental performance of waste management efforts.

There are three major components to the waste audit:
A) Preparation B) Sorting, recording, and cleanup C)
Analysis and reporting. When undertaking an audit, one person should be designated as the audit coordinator. This person is responsible for preparing and leading the audit. When first beginning to conduct waste audits, it is advisable to seek assistance from regional waste education officers if they are available. The audit coordinator must ensure that all preparations are carried out before participants begin auditing and measuring waste.

Preparations of steps for waste audit are summarized as follows for ready reference :

Identify which material streams will be audited. Use the materials stream categorization guide to help.

- 1) Ensure that the waste is sorted into separate piles based on waste stream, day collected, or source location if auditing specific areas or buildings.
- 2) Choose an adequate sample size for the audit. The % of waste audited will depend on total waste generation of the organization- larger numbers yield more accurate results.
- 3) Locate a suitable facility for storing the waste and conducting the audit.
- 4) Verify the number of participants who will be helping with the audit and obtain the required safety materials.

- 5) Choose an auditing procedure that best suits the needs of the firm.
- 6) Obtain the materials required for that method.
- 7) Conduct a training session with the audit participants. Training requirements will differ according to chosen audit type.
- 8) Give the people who are data recording the auditing packages and have them review the sheets and ask any questions before sorting begins.
- 9) Assign groups according to the chosen audit type.

INTRODUCTION TO WASTE AUDITING PROCESS :

In the context of this discussion, waste is taken as a broad term to include any non-product discharge from a process. Thus, it describes discharges in the gaseous, liquid and solid phases. In the past, waste management has concentrated on end-of-pipe waste treatment; designing waste treatment plants and installing pollution control equipment to prevent contamination of the environment.

A different philosophy has emerged in recent times, that of waste prevention and reduction. Now we ask how can we prevent the generation of this waste ? How can we reduce this waste? Can we reuse or recover this waste?

This progressive shift from waste treatment towards waste prevention has the following benefits :

- waste quantities are reduced;
- raw material consumption and therefore costs are reduced;
- waste treatment costs are reduced;
- the pollution potential is reduced;
- working conditions are improved;

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- process efficiency is improved.

In order to prevent or reduce waste generation you need to examine your process to identify the origins of wastes, the operational problems associated with your process and those areas where improvements can be made.

A waste audit is the first step in an on-going programme designed to achieve maximum resource optimization and improved process performance. It is a common sense approach to problem identification and problem solving.

A waste audit enables you to take a comprehensive look at your site or process to facilitate your understanding of material flows and to focus your attention on areas where waste reduction and therefore cost saving is possible.

Undertaking a waste audit involves observing, measuring, recording data and collecting and analyzing waste samples. To be effective it must be done methodically and thoroughly together will full management and operator support.

A good waste audit :

- defines sources, quantities and types of waste being generated;
- collates information on unit operations, raw materials, products, water usage and wastes;
- highlights process inefficiencies and areas of poor management
- helps set targets for waste reduction;
- permits the development of cost-effective waste management strategies;
- raises awareness in the workforce regarding the benefits of waste reduction;
- increases your knowledge of the process;
- helps to improve process efficiency.

The waste audit procedure can be applied on various scales. A waste audit of a region can indicate problem industries. At the plant level, wastes can be traced to particular processes allowing allocation of treatment charges where necessary; and at the process level the exact origins of wastes can be identified enabling waste reduction measures to be established.

Waste audit approach

A waste audit approach leading to the implementation of a waste reduction action plan is illustrated in the

form of a flow diagram below.

Three case studies are included to illustrate the wide application of this waste audit and reduction approach.

QUICK REFERENCE AUDIT GUIDE

AUDIT PREPARATION	Step 1	prepare and organize audit team and resources
PHASE I: PRE-ASSESSMENT	Step 2	divide process into unit operations
	Step 3	construct process flow diagrams linking unit operations

PROCESS INPUTS

- Step 4 determine inputs
- Step 5 record water usage
- Step 6 measure current levels of waste reuse/recycling

PROCESS OUTPUTS

- Step 7 quantify products/by-products
- Step 8 account for wastewater
- Step 9 account for gaseous emissions
- Step 10 account for off-site wastes

PHASE 2 : MATERIAL BALANCE

DERIVE A MATERIAL BALANCE

- Step 11 assemble input and output information
- Step 12 derive a preliminary material balance
- Step 13 and 14 evaluate and refine material balance

IDENTIFY WASTE REDUCTION OPTIONS

- Step 15 identify obvious waste reduction measures
- Step 16 target and characterize problem wastes
- Step 17 investigate the possibility of waste segregation
- Step 18 identify long-term waste reduction measures

PHASE 3 : SYNTHESIS

EVALUATE WASTE REDUCTION OPTIONS

- Step 19 undertake environmental and economic evaluation of waste reduction options, list viable options

WASTE REDUCTION ACTION PLAN

Step 20 design and implement a waste reduction action plan to achieve improved process efficiency

STANDARD AUDIT PROCEDURE

This module describes a step-by-step approach for carrying out a waste audit. It is designed to be generic to apply to a broad spectrum of industry. The approach comprises three phases; a pre-assessment phase for audit preparation; a data collection phase to derive a material balance; and a synthesis phase where the findings from the material balance are translated into a waste reduction action plan.

It is possible that not all of the audit steps will be relevant to every situation. Similarly, in some situations additional steps may be required. However, the following approach should form the basis of your investigations.

PHASE 1: PRE - ASSESSMENT

Step 1: Audit Focus and Preparation

A thorough preparation for a waste audit is a prerequisite for an efficient and cost-effective study. Of particular importance is to gain support for the audit from top-level management, and for the implementation of results; otherwise there will be no real action.

The waste audit team should be identified. The number of people required on an audit team will depend on the size and complexity of the processes to be investigated. A waste audit of a small factory may be undertaken by one person with contributions from the employees. A more complicated process may require at least 3 or 4 people: technical staff, production employees and an environmental specialist. Involving personnel from each stage of the manufacturing operations will increase employee awareness of waste reduction and promote input and support for the programme.

A waste audit will probably require external resources, such as laboratory analytical facilities and possibly equipment for sampling and flow measurements. You should attempt to identify external resource requirements at the outset of the project.

Analytical services and equipment may not be available to a small factory. If this is the case, investigate the possibility of forming a waste auditing association with other factories or industries; under this umbrella the external resource costs can be shared.

It is important to select the focus of your audit at the preparation stage. You may wish the waste audit to cover a complete process or you may want to concentrate on a selection of unit operations within a process. The focus will depend on the objectives of the waste audit. You may wish to look at waste minimization as a whole or you may wish to concentrate on particular wastes, for example :

- raw material losses;
- wastes that cause processing problems;
- wastes considered to be hazardous or for which regulations exist;
- wastes for which disposal costs are high.

A good starting point for designing a waste audit is to determine the major problems/wastes associated with your particular process or industrial sector. The Rapid Assessment of Sources of Air, Water and Land Pollution published by the World Health Organisation (WHO, 1982) is a useful reference for identifying the type and typical quantities of wastes associated with particular industries. For example, Table 1 describes the likely waste quantities for the tanning industry.

Table 1: Manufacture of Leather and Products of Leather, Leather Substitutes and Fur, except Footwear and Wearing Apparel

	Pulp hair/chrome tanning/finishing	Solve hair/chrome tanning/finishing	Solve hair/vegetable tanning/finishing
Waste volume (m ³ /t of hides)	53	63	50
BOD ₅ (kg/t of hides)	95	69	67
COD (kg/t of hides)	260	140	250
Suspended Solids (kg/t of hides)	140	145	135
Total Solids (kg/t of hides)	525	480	345
Total Chromium (kg/t of hides)	4.3	4.9	0.2
Sulphides (kg/t of hides)	8.5	0.8	1.2
Oil and Grease (kg/t of hides)	19	43	33
Total N (kg/t of hides)	17	13	9.2
pH	1-13	4-12.6	2-13

(Source: WHO, 1982)

All existing documentation and information regarding the process, the plant or the regional industrial sector should be collated and reviewed as a preliminary step. Regional or plant surveys may have been undertaken; these could yield useful information indicating the areas for concern and will also show gaps where no data are available. The following prompts give some guidelines on useful documentation.

- ❖ Is a site plan available?
- ❖ Are any process flow diagrams available?
- ❖ Have the process wastes ever been monitored - do you have access to the records?
- ❖ Do you have a map of the surrounding area indicating watercourses, hydrology and human settlements?
- ❖ Are there any other factories/plants in the area which may have similar processes?

Other general data which can be collated quickly and which are useful orientation material are described below.

- What are the obvious wastes associated with your process?
- Where is water used in greatest volume?
- Do you use chemicals that have special instructions for their use and handling?
- Do you have waste treatment and disposal costs - what are they?
- Where are your discharge points for liquid, solid and gaseous emissions?

The plant employees should be informed that the audit will be taking place, and they should be encouraged to take part. The support of the staff is imperative for this type of interactive study. It is important to undertake the audit during normal working hours so that the employees and operators can be consulted, the equipment can be observed in operation and, most importantly, wastes can be quantified.

Step 2: Listing Unit Operations

Your process will comprise a number of unit operations. A unit operation may be defined as an area of the process or a piece of equipment where materials are input, a function occurs and materials are output, possibly in a different form, state or composition. For example, a process may comprise the following unit operations: raw material storage, surface treatment of components, rinsing, painting, drying, product storage

and waste treatment.

An initial site survey should include a walk around the entire manufacturing plant in order to gain a sound understanding of all the processing operations and their interrelationships. This will help the audit team decide how to describe a process in terms of unit operations. During this initial overview, it is useful to record visual observations and discussions and to make sketches of **process layout, drainage systems, vents, plumbing and other material transfer areas**. These help to ensure that important factors are not overlooked.

The audit team should consult the production staff regarding normal operating conditions. The production or plant staff are likely to know about waste discharge points, unplanned waste generating operations such as spills and washouts, and can give the auditors a good indication of actual operating procedures. Investigations may reveal that night-shift procedures are different from day-shift procedures; also, a plant tour may disclose that actual material handling practices are different from those set out in written procedures.

A long-standing employee could give some insight into recurring process problems. In the absence of any historical monitoring this information can be very useful. Such employee participation must however be a non-blaming process; otherwise it will not be as useful as it could be.

During the initial survey, note imminent problems that need to be addressed before the audit is complete.

The waste audit team needs to understand the function and process variables associated with each unit operation. Similarly, all the available information on the unit operations and the process in general should be collated, possibly in separate files. It is useful to tabulate this information, as shown in Table 2.

Table 2: Identification of Unit Operations

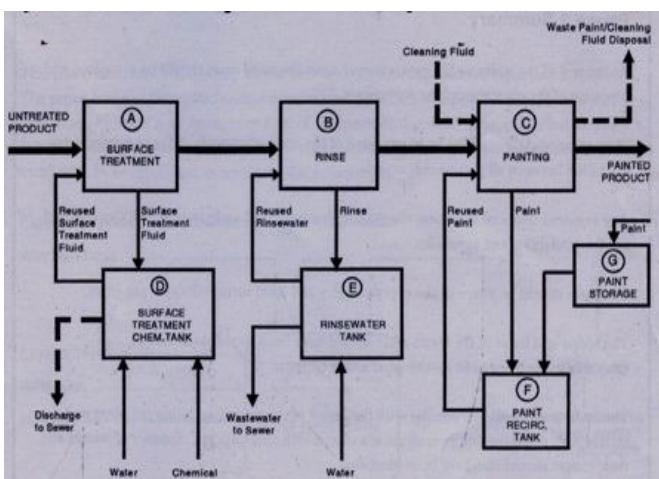
Unit Operation	Function	File Number
(A) Surface Treatment	Surface treatment of metal products 10 m ³ spray chamber, 6 jets, 100 l/min pump	1
(B) Rinsing	Washing metal products before painting	2

Identification of materials handling operations (discussion, automatic, bulk, drums etc) covering raw materials, transfer practices and products is also an important aspect which could usefully be included in the above tabulation as a prelude to development of a materials balance (Phase 2).

Step 3: Constructing Process Flow Diagrams

By connecting the individual unit operations in the form of a block diagram you can prepare a process flow diagram. Intermittent operations such as cleaning, make-up or tank dumping may be distinguished by using broken lines to link the boxes. Figure 1 is an example of a simplified process flow diagram for a metal finishing process.

Figure 1 : A Process Flow Diagram for a Metal Finishing Process



For complex processes prepare a general flow diagram illustrating the main process areas and, on separate sheets of paper, prepare detailed flow diagrams for each main processing area. The printed circuit board manufacture case study shows how this can be done (Case Study 3).

Now you must decide on the level of detail that you require to achieve your objectives.

It is important to realise that the less detailed or larger scale the audit becomes, the more information is likely to be lost or masked by oversimplification. Establishing the correct level of detail and homing in on specific areas is very important at an early stage.

Pay particular attention to correcting any obvious waste

arisings which can be reduced or prevented easily, before proceeding to the development of a material balance (Phase 2). By making simple changes at this early stage, the resultant benefits will help enlist the participation and stimulate the enthusiasm of employees for the total waste audit/reduction programme.

Summary (Phase 1) :

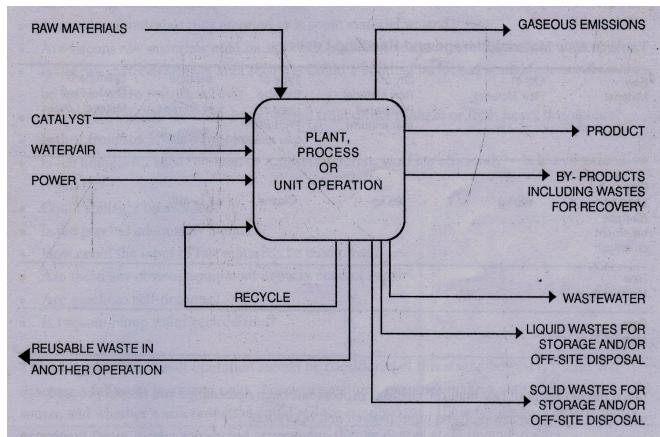
- At the end of the waste audit pre-assessment stage the audit team should be organized and be aware of the objectives of the waste audit.
- Plant personnel should have been informed of the audit purpose in order to maximize co-operation between all parties concerned.
- Any required financial resources should have been secured and external facilities checked out for availability and capability.
- The team should be aware of the overall history and local surroundings of the plant.
- The scope and focus of the waste audit should have been established, and a rough timetable worked out to fit in with production patterns.
- The audit team should be familiar with the layout of the processes within the plant and should have listed the unit operations associated with each process. Sources of wastes and their causes should also have been identified.
- It should be possible to draw process flow diagrams highlighting those areas to be covered in the waste audit.
- Any very obvious waste saving measures which can be introduced easily should be implemented immediately.
- The findings of the Phase 1 investigations could usefully be presented to the management in the form of a brief pre-assessment report in order to reaffirm their commitment into the next phase.

PHASE 2 :
MATERIAL BALANCE : PROCESS INPUTS AND OUTPUTS

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

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

Figure 2: Typical Components of a Material Balance



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

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

Step 4 : Determining Inputs

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

As a first step towards quantifying raw material usage, examine purchasing records; this rapidly gives you an

idea of the sort of quantities involved. In many situations the unit operations where raw material losses are greatest are raw material storage and transfer. You should look at these operations in conjunction with the purchasing records to determine the actual net input to the process.

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

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

Table 3: Raw Material Storage and Handling Losses

Raw Material	Qty. of Raw Material purchased (per annum)	Type of storage used in production (per annum)	Average length off storage	Estimated Annual Raw Material Losses	
Raw Material 1 (Surface treatment chemical)	100kg	95kg	closed	1 month	5 kg
Raw Material 2					
Raw Material 3					

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

If accurate information about raw material consumption rates for individual unit operations is not available then you will need to take measurements to determine average figures. Measurements should be taken for an appropriate length of time. For example, if a batch takes one week to run, then measurements should be taken over a period of at least three weeks; these figures can be extrapolated for monthly or annual figures.

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

For solid raw materials, ask the warehouse operator how many sacks are stored at the beginning of the week or prior to a unit operation; then ask him again at the end of the week or unit operation. Weigh a selection of sacks to check compliance with specifications.

For liquid raw materials such as water or solvents, check storage tank capacities and ask operators when a tank was last filled. Tank volumes can be estimated from the tank diameter and tank depth. Monitor the tank levels and the number of tankers arriving on site.

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

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

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

Input data should be recorded on your process flow

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

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

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

Table 4: Input Data

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

Step 5: Recording Water Usage

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

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

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

For each unit operation consider the following.

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

It is unlikely that the answers to these questions will be readily available - you will need to undertake a monitoring programme to assess the use of water in each

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unit operation. Again, the measurements must cover a sufficient period of time to ensure that all actions are monitored. Pay particular attention to intermittent actions such as steam cleaning and tank washouts; water use is often indiscriminate during these operations. Find out when these actions will be undertaken so that detailed measurements can be made.

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

Table 5: Water Usage

	Cleaning	Steam	Cooling	Other
Unit Operation A				
Unit Operation B				
Unit Operation C				

All measurements in standard units, for example m³/annum or m³/day.

All measurements in standard units, for example m³/annum or m³/day.

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

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

Step 6 : Measuring Current Levels of Waste Reuse / Recycling

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

process. These reused waste streams should be quantified.

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

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

Summary of steps 4, 5 and 6

By the end of Step 6 you should have quantified all your process inputs.

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

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

Step 7: Quantifying Process Outputs

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

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

Table 6: Process Outputs

Unit Operation	Product	By-Product	Waste to be Reused	Wastewater	Gaseous Emissions	Stored Wastes	Liquid/Solid Wastes Off-Site
Unit Operation A							
Unit Operation B							
Unit Operation C							
Total							

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

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

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

Step 8: Accounting for Wastewater

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

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

- Identify the effluent discharge points; that is, where does wastewater leave the site? Waste-water may go to an effluent treatment plant or directly to a public sewer or watercourse. One factor that is often overlooked is the use of several discharge points - it is important to identify the location, type and size of all discharge flows.
- Identify where flows from different unit operations or process areas contribute to the overall flow. In this way, it is possible to piece together the drainage network for your site. This can lead to startling discoveries of what goes where!
- Once the drainage system is understood it is possible to design an appropriate sampling and flow measurement programme to monitor the wastewater flows and strengths from each unit operation.

- Plan your monitoring programme thoroughly and try to take samples over a range of operating conditions such as full production, start up, shut down and washing out. In the case of combined storm water and wastewater drainage systems, ensure that sampling and flow measurements are carried out in dry weather.
- For small or batch wastewater flows it may be physically possible to collect all the flow for measurement using a pail and wristwatch. Larger or continuous wastewater flows can be assessed using flow measurement techniques.

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

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

- You should include wastewater analyses such as pH, chemical oxygen demand (COD), biochemical oxygen demand (BOD₅), suspended solids and grease and oil.
- Other parameters that should be measured depend on the raw material inputs. For example, an electroplating process is likely to use nickel and chromium. The metal concentrations of the wastewater should be measured to ensure that the concentrations do not exceed discharge regulations, but also to ensure that raw materials are not being lost to drain. Any toxic substances used in the process should be measured.
- Take samples for laboratory analysis. Composite samples should be taken for continuously-running wastewater. For example, a small volume, 100 ml, may be collected every hour through a production period of ten hours to gain a 1 litre composite sample. The composite sample represents the average wastewater conditions over that time. Where significant flow variations occur during the discharge period, consideration should be given to varying the size of individual samples in proportion to flow rate in order to ensure that a representative composite sample is obtained. For batch tanks and periodic drain down, a single spot sample may be adequate (check for variations between batches before deciding on the appropriate sampling method).

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

Table 7: Wastewater Flows

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

Step 9: Accounting for Gaseous Emissions

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

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

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

First calculate the amount of sulphur burned:

$$1000 \text{ kg coal} \times 0.03 \text{ kg sulphur/kg coal} = 30 \text{ kg sulphur/day}$$

The combustion reaction is approximately:

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

$$\text{kg-moles S} = 30 \text{ kg}/32 \text{ kg per kg-mole} = \text{kg-mole of SO}_2 \text{ formed}$$

$$\text{kg SO}_2 \text{ formed} = (64 \text{ kg SO}_2/\text{kg-mole}) \times \text{kg-moles SO}_2 = 64 \times 30/32 = 60 \text{ kg}$$

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

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

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

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

Step 10: Accounting for Off-Site Wastes

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

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

Table 8: Wastes for Off-site Disposal

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

You should ask several questions during the data collection stage.

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

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

Summary of Steps 7, 8, 9 and 10

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

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

Step 11: Assembling Input and Output Information for Unit Operations

One of the basic laws applied to chemical engineering is that of the material balance which states that the total of what goes into a process must equal the total of what comes out. Prepare a material balance at a scale appropriate for the level of detail required in your study. For example, you may require a material balance for each unit operation or one for a whole process may be sufficient. In this discussion the preparation of a material balance for the unit operation scale is illustrated.

Preparing a material balance is designed to gain a better understanding of the inputs and outputs, especially waste, of a unit operation such that areas where information is inaccurate or lacking can be identified. Imbalances require further investigation. Do not expect a perfect balance -

your initial balance should be considered as a rough assessment to be refined and improved.

Assemble the input and output information for each unit operation and then decide whether all the inputs and 'outputs need to be included in the material balance. For example, this is not essential where the cooling water input to a unit operation equals the cooling water output. Standardise units of measurement (litres, tonnes or kilogrammes) on a per day, per year or per batch basis.

Summarise the measured values in standard units by reference to your process flow diagram. It may have been necessary to modify your process flow diagram following the in-depth study of the plant.

Step 12: Deriving a Preliminary Material Balance for Unit Operations

Now it is possible to complete a preliminary material balance. For each unit operation utilise the data developed in Steps 1-10 and construct your material balance. Display your information clearly. Figure 3 is one way of presenting the material balance information.

Figure 3: Preliminary Material Balance for Each Unit Operation

Inputs Raw Material 1 Raw Material 2 Raw Material 3 Waste Reuse Water Total	(amounts in standard units per annum)
↓	Unit Process A
Outputs per annum) Product By-product Raw Material Storage and Handling Losses Reused Wastes Wastewater Gaseous Emissions Stored Wastes Hazardous Liquid Waste Transported Off-Site Hazardous Solid Waste Transported Off-Site Non-Hazardous Liquid Waste Transported Off-Site Non-Hazardous Solid Waste Transported Off-Site Total	↓

Note that a material balance will often need to be carried out in weight units since volumes are not always conserved. Where volume measurements have to be converted to weight units, take account of the density of the liquid, gas or solid concerned.

Once the material balance for each unit operation has been completed for raw material inputs and waste outputs it might be worthwhile repeating the procedure with respect to each contaminant of concern. It is highly desirable to carry out a water balance for all water inputs and outputs to and from unit operations because water imbalances may indicate serious underlying process problems such as leaks or spills. The individual material balances may be summed to give a balance for the whole process, a production area or factory.

Step 13: Evaluating the Material Balance

The individual and sum totals making up the material balance should be reviewed to determine information gaps and inaccuracies. If you do have a significant material imbalance then further investigation is needed. For example, if outputs are less than inputs look for potential losses or waste discharges (such as evaporation). Outputs may appear to be greater than inputs if large measurement or estimating errors are made or some inputs have been overlooked.

At this stage you should take time to re-examine the unit operations to attempt to identify where unnoticed losses may be occurring. It may be necessary to repeat some data collection activities. Remember that you need to be thorough and consistent to obtain a satisfactory material balance. The material balance not only reflects the adequacy of your data collection, but by its very nature, ensures that you have a sound understanding of the processes involved.

Step 14: Refining the Material Balance

Now you can reconsider the material balance equation by adding those additional factors identified in the previous step. If necessary, estimates of unaccountable losses will have to be calculated.

Note that, in the case of relatively simple manufacturing plants, preparation of a preliminary material balance and its refinement (Steps 13 and 14) can usefully be combined. For more complex waste audits however, two separate steps

are likely to be more appropriate.

Remember, the inputs should ideally equal the outputs but in practice this will rarely be the case and some judgment will be required to determine what level of accuracy is acceptable.

In the case of high-strength or hazardous wastes, accurate measurements are needed to design waste reduction options. It is possible that the material balance for a number of unit operations will need to be repeated. Again, continue to review, refine and, where necessary, expand your database. The compilation of accurate and comprehensive data is essential for a successful waste audit and subsequent waste reduction action plan. You cannot reduce what you do not know is there.

Steps 11,12, 13 and 14 Summary

By the end of Step 14, you should have assembled information covering process inputs and process outputs. These data should be organised and presented clearly in the form of material balances for each unit operation.

These data form the basis for the development of an action plan for waste minimization.

Phases 1 and 2 have covered planning and undertaking a waste audit, resulting in the preparation of a material balance for each unit operation.

Phase 3 represents the interpretation of the material balance to identify process areas or components of concern.

The material balance focuses the attention of the auditor. The arrangement of the input and output data in the form of a material balance facilitates your understanding of how materials flow through a production process. To interpret a material balance it is necessary to have an understanding of normal operating performance. How can you assess whether a unit operation is working efficiently if you do not know what is normal? A member of your team must have a good working knowledge of the process. This knowledge can be supported by texts such as the Rapid Assessment of Sources of Air, Land and Water Pollution (WHO, 1982).

To a trained eye the material balance will indicate areas for concern and help to priorities' problem wastes. You

should use the material balance to identify the major sources of waste, to look for deviations from the norm in terms of waste production, to identify areas of unexplained losses and to pin-point operations which contribute to flows that exceed national or site discharge regulations. Process efficiency is synonymous with waste minimization.

Different waste reduction measures require varying degrees of effort, time and financial re-sources. They can be categorized as two groups.

- Obvious waste reduction measures, including improvements in management techniques and house-keeping procedures that can be implemented cheaply and quickly.
- Long-term reduction measures involving process modifications or process substitutions to eliminate problem wastes.

Increased reuse/recycling to reduce waste falls between the immediate and the more substantial waste reduction measures.

Steps 15,16 and 17 describe how to identify waste reduction measures.

Step 15: Examining Obvious Waste Reduction Measures

It may have been possible to implement very obvious waste reduction measures already, before embarking on obtaining a material balance (ref Step 3). Now consider the material balance information in conjunction with visual observations made during the whole of the data collection period in order to pinpoint areas or operations where simple adjustments in procedure could greatly improve the efficiency of the process by reducing unnecessary losses. Use the information gathered for each unit operation to develop better operating practices for all units.

Significant waste reductions can often be achieved by improved operation, better handling and generally taking more care. The following list of waste reduction hints can be implemented immediately with no or only small extra costs.

Specifying and Ordering Materials

- Do not over-order materials especially if the raw materials or components can spoil or are difficult to

store.

- Try to purchase raw materials in a form which is easy to handle, for example, pellets instead of powders.
- It is often more efficient 'and certainly cheaper to buy in bulk.

Receiving Materials

- Demand quality control from suppliers by refusing damaged, leaking or unlabelled containers. Undertake a visual inspection of all materials coming on to the site.
- Check that a sack weighs what it should weigh and that the volume ordered is the volume supplied.
- Check that composition and quality are correct

Material Storage

- Install high-level control on bulk tanks to avoid overflows.
- Bund tanks to contain spillages.
- Use tanks that can be pitched and elevated, with rounded edges for ease of draining and rinsing.
- Dedicated tanks, receiving only one type of material, do not need to be washed out as often as tanks receiving a range of materials.
- Make sure that drums are stored in a stable arrangement to avoid damaging drums while in storage.
- Implement a tank checking procedure - dip tanks regularly and document to avoid discharging a material into the wrong tank.
- Evaporation losses are reduced by using covered or closed tanks.

Material and Water Transfer and Handling

- Minimise the number of times materials are moved on site.
- Check transfer lines for spills and leaks.
- Is flexible pipework too long?
- Catch drainings from transfer hoses.
- Plug leaks and fit flow restrictors to reduce excess water consumption.

Process Control

- Feedback on how waste reduction is improving the process motivates the operators - it is vital that the employees are informed of why actions are taken and what it is hoped they will achieve.
- Design a monitoring programme to check the emissions

and wastes from each unit operation.

- Regular maintenance of all equipment will help to reduce fugitive process losses.

Cleaning Procedures

- Minimise the amount of water used to wash out and **rinse vessels - on many sites indis-criminate** water use contributes a large amount to wastewater flows. Ensure that hoses are not left running by fitting self-sealing valves.
- Investigate how washing water can be contained and used again before discharge to drain. The same applies to solvents used to clean; these can often be used more than once.

Tightening up house-keeping procedures can reduce **waste considerably**. Simple, quick adjustments should be made to your process to achieve a rapid improvement in process efficiency. Where such obvious reduction measures do not however solve the entire waste disposal problem, more detailed consideration of waste reduction options will be needed (Steps 16 -18).

Step 16: Targeting and Characterizing Problem Wastes

Use the material balance for each unit operation to pinpoint the problem areas associated with your process.

The material balance exercise may have brought to light the origin of wastes with high treatment costs or may indicate which wastes are causing process problems in which operations. The material balance should be used to focus your priorities for long-term waste reduction.

At this stage, it may be worthwhile considering the **underlying causes as to why wastes are generated** and the factors which lead to these; for example, poor technology, lack of maintenance and non-compliance with company procedures.

Additional sampling and characterization of your wastes might be necessary involving more in-depth analysis to ascertain the exact concentrations of contaminants.

List the wastes in order of priority for reduction actions.

Step 17: Segregation

Segregation per se is arguably not properly part of a waste audit's step-by-step sequence, being but one of numerous

measures which can lead to waste reduction activities. It is however the most central of such options and is a universal issue which needs to be addressed.

Segregation of wastes can offer enhanced opportunities for recycling and reuse with resultant savings in raw material costs. Concentrated simple wastes are more likely to be of value than dilute or complex wastes.

Mixing wastes can enhance pollution problems. If a highly-concentrated waste is mixed with a large quantity of weak, relatively uncontaminated effluent the result is a larger volume of waste requiring treatment. Isolating the concentrated waste from the weaker waste can reduce treatment costs. The concentrated waste could be recycled/reused or may require physical, chemical and biological treatment to comply with discharge consent levels whereas the weaker effluent could be reused or may only require settlement before discharge.

Therefore, waste segregation can provide more scope for recycling and reuse while at the same time reducing treatment costs.

Review your waste collection and storage facilities to determine if waste segregation is possible. Adjust your list of priority wastes accordingly.

Step 18: Developing Long-Term Waste Reduction Options

Waste problems that cannot be solved by simple procedural adjustments or improvements in house-keeping practices will require more substantial long-term changes.

It is necessary to develop possible prevention options for the waste problems.

Process or production changes which may increase production efficiency and reduce waste generation include :

- changes in the production process - continuous versus batch;
- equipment and installation changes;
- changes in process control - automation;
- changes in process conditions such as retention times, temperatures, agitation, pressure, catalysts;
- use of dispersants in place of organic solvents where appropriate;

- reduction in the quantity or type of raw materials used in production;
- raw material substitution through the use of wastes as raw materials or the use of different raw materials that produce less waste or less hazardous waste;
- process substitution with cleaner technology.

Waste reuse can often be implemented if materials of sufficient purity can be concentrated or purified. Technologies such as reverse osmosis, ultrafiltration, **electrodialysis, distillation, electro-lysis** and ion exchange may enable materials to be reused and reduce or eliminate the need for waste treatment.

Where waste treatment is necessary, a variety of technologies should be considered. These include physical, chemical and biological treatment processes. In some cases the treatment method can also recover valuable materials for reuse. Another

industry or factory may be able to use or treat a waste that you cannot treat on-site. It may be worth investigating the possibility of setting up a waste exchange bureau as a structure for sharing waste treatment and reuse facilities. The Resource Section (Chapter 4) cites sources of technical information relating to recovery, reuse, waste treatment and associated technologies.

Consider also the possibilities for product improvements or changes yielding cleaner, more environmentally-friendly products, both for existing products and in the development of new products.

Summary of Steps 15,16,17 and 18

At the end of Step 18 you should have been able to identify all the waste reduction options which could be implemented.

.....to be continued in next issues



INDIA HAS POTENTIAL TO BECOME BIGGEST FOOTWEAR PRODUCER BY 2020 : MINISTER GANGWAR

Indian industry has a huge potential to surpass China in footwear production by 2020, Union Minister Santosh Gangwar said today. The government has recognized footwear as a priority sector and introduced favourable policy reforms along with the GST, the Minister of State for Finance said at the inauguration of the third edition of the India International Footwear Fair 2017 here.

With 95 per cent of the domestic footwear production, India is the second largest global producer of footwear after China. The minister also assured the footwear industry of all possible support over its demand to reconsider GST slabs pertaining to the sector.

The footwear sector has been categorized into two slabs. Footwear priced below Rs.500 will be taxed at 5 per cent while the others would attract 18 per cent levy under the GST. According to the Confederation of Indian Footwear Industries, the dual tax slab rates on footwear

would have a detrimental impact on the overall sector as the footwear priced between Rs.500 and Rs.1000 will be taxed more.

Stressing upon the need to keep strict quality control, Gangwar asked the industry to raise its export bar which has only 45 per cent share in India's total leather exports.

Speaking on the occasion, India Trade Promotion Organization CMD L C Goyal said it is poised to touch new horizons by setting up a world class integrated – exhibition – cum – convention – centre at Pragati Maidan. He said that all clearances from different authorities have been received for the project and as ITPO is concerned about the environmental aspect, around 5000 trees would be planted inside Pragati Maidan during the project.

(Source : New Indian Express – 04.08.2017)

WORLD LEATHER CEO SAYS SHIPMENTS OF WET - SALTED HIDES SHOULD STOP



The chief executive of World Leather, Simon Yarwood, delivered a keynote speech at the World Leather Congress in Shanghai on August 29.

During the speech he told the audience that the time had come to stop shipping wet-salted hides from one side of the world to the other, arguing that a restructuring, leading to hides being processed at least as far as wet blue or wet white stage as close to source as possible, is necessary.

He said: "The practice of salting and shipping those hides across oceans before tanners get to work on them needs to stop."

He argued that carrying out wet-end processing close to slaughter would be a far better way to prevent hide resources from going to waste, would be far more environmentally responsible, would improve the leather industry's relationships with shipping companies, save money and allow cattle-rearing countries to add more value to their own natural resources.

"We are under severe pressure to improve our environmental footprint without delay," Mr Yarwood concluded, "and this would represent good progress. Doing nothing is not an option."



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Down Memory Lane



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India : Price pressures jump in July on seasonal effects and GST impact

In July, consumer prices jumped 1.67% from the previous month, which followed June's revised 0.46% rise. July's spike in prices mostly reflected higher vegetable prices and the impact of the Goods and Services Tax (GST), which came into effect on 1 July. Inflation accelerated to a three-month high of 2.4% in July (June: 1.5%). The reading overshot market expectations of 1.9%. Despite the increase, inflation is still below the Central Bank's medium-term target of 4.0%.

The wholesale price index (WPI) in July swung to a 1.06% increase from the previous month, which contrasted June's revised 0.18% fall. Sharp price rises for vegetables stoked the swing, while a fall in the price of pulses tamed it somewhat. Wholesale price inflation gathered pace in July, hitting 1.9%, which was up from 0.9% in June. The trend continued to point upward, with the annual average wholesale inflation rate rising to 2.6% from 2.5% in June.

Focus Economics Consensus Forecast panelists expect consumer price inflation to average 4.2% in FY 2017, which is unchanged from last month's forecast. In FY 2018, the panel expects consumer price inflation to average 4.7%.

(Source – JILTA Team)

India : Trade Deficit widens in July

Recently released data related to India's external sector showed that the trade deficit totaled USD 11.5 billion in July, which was a greater shortfall than the USD 7.8 billion gap recorded in July 2016 (June 2017: USD 12.9 billion deficit).

The deterioration in trade data came on the back of moderate growth in exports, while imports grew robustly. Exports grew 3.9% annually in July, below the previous month's 4.4% increase and totaling USD 22.5 billion. Imports expanded a notable 15.3% over the same month last year (June: +18.9% year-on-year), and totaled USD 34.0 billion.

The rolling 12-month trade deficit widened from USD 127 billion in June to USD 130 billion in July.

Focus Economics Consensus Forecast panelists expect exports to grow 7.6% in FY 2017 and 8.0% in FY 2018.

(Source – JILTA Team)

Govt notifies changes to Banking Regulation Act

The government has notified the Banking Regulation (Amendment) Act under which it can authorise the RBI to issue directions to banks to initiate insolvency resolution process to recover bad loans.

The banking sector is saddled with non-performing assets (NPAs) of over Rs 8 lakh crore, of which Rs 6 lakh crore is with public sector banks (PSBs).

Earlier this month, Parliament had approved the Act, which replaced an ordinance in this regard.

The government in May had promulgated an ordinance authorising the Reserve Bank of India (RBI) to issue directions to banks to initiate insolvency resolution process under the Insolvency and Bankruptcy Code, 2016.

Following the ordinance, the RBI had identified 12 accounts each having more than Rs 5,000 crore of outstanding loans and accounting for 25 per cent of total NPAs of banks for immediate referral for resolution under the bankruptcy law.

The loan defaulters identified by the RBI include, Essar Steel, Bhushan Steel, ABG Shipyard, Electrosteel and Alok Industries.

Under the Banking Regulation (Amendment) Act, 2017, the RBI can issue directions to banks for resolution of stressed assets.

The RBI can specify authorities or committees to advise banks on resolution of stressed assets. The members on the committees will be appointed or approved by the RBI.

The bulk of the NPAs are in sectors such as power, steel, road infrastructure and textiles.

LEATHER SCIENCE ABSTRACTS

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**NATIONAL INFORMATION CENTER FOR LEATHER & ALLIED INDUSTRIES (NICLAI)
NATIONAL INFORMATION SYSTEM FOR SCIENCE & TECHNOLOGY (NISSAT)**

**CENTRAL LEATHER RESEARCH INSTITUTE
ADYAR, CHENNAI 600 020, INDIA**

Leather Science Abstracts (**LESA**) is published by National Information Center for Leather and Allied Industries (**NICLAI**), Central Leather Research Institute (**CLRI**), Chennai.

It is a monthly abstracting periodical covering significant papers/articles published in the fields of Leather Science and Technology, Footwear Technology, Leatherware and Leathergoods, Leather chemicals, Leather machinery, Leather economics etc., appearing in about 500 scientific and technical periodicals published all over the world. The abstracts are presented under well defined subject headings and include indexes.

All enquiries for further details should be addressed to: THE DIRECTOR, (**ATTN.: EDITOR, LESA**)
CENTRAL LEATHER RESEARCH INSTITUTE, ADYAR, CHENNAI-600 020, INDIA.

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LEATHER SCIENCE AND TECHNOLOGY

LEATHER INDUSTRY. HISTORY. MANAGEMENT. ECONOMICS. EDUCATION

50.15647

United passion.MUIRHEAD (J), (Leather Intl; 217, 4859; 2016, Apr.; 45 & 47).

Stresses the importance of developing a coordinated and united strategy for the prosperity of the leather industry. (1 Photo).

50.15648

Ten ways to create a culture of innovation.MARIWALA (H), (M/s. Marico Limited, 7th Floor, Grande Palladium, No. : 175, CST(Chembur-Santa Cruz Trunk) Road, Kalina, Santa Cruz(East), Mumbai-400 098, India). (Chem. Wkly.; 61, 37; 2016, Apr., 19; 206-7).

A question is being asked about the way in which every organization should create a culture of innovation so that everybody in an organization thinks of it. Suggests and briefly explains the benefits respectively of pursuing each and every one of the ways that should have to be created for a culture of innovation. (1 Fig.).

50.15649

Price challenge & productivity. SAHASRANAMAN (A), (M/s. Indian Leather Industry Foundation, No. : 87 Shreyas Apartments, 1st Floor, Near Jesus Calls Prayer Tower, Greenways Lane, Raja Annamalaipuram, Chennai-600 028, India). (Leather News India; 8, 1; 2017, Jan.; 107-8).

Summarizes some trends that are visible in the global market for the Indian leather industry.

50.15650

Maintenance Management for process industry. CHAKRAVORTY (SK), (Chem. Wkly.; 62, 24; 2017, Jan., 17; 205-9).

Discusses the optimum plant maintenance strategy that should be selected depending on the criticality of the plant for managing the process plant productivity. States that the criticality can be decided based on the down-

time cost, direct cost of maintenance, costs due to quality problems and safety risks-posed by the plant and the other criteria for selecting the optimum maintenance strategy is the type of failures; for example, random or wear-out. Discusses also that the breakdown maintenance strategy cannot be adopted, whereas for a non-critical plant even break-down maintenance can be more economical than other strategies for critical plants. It is realized that the Proactive Maintenance will be better in case the failures are of random type and not observable and the Condition Based Maintenance(CBM) will be the best strategy, if the failure is observable and the time based prospective memory(PM) will be the best strategy if the failure is not observable in case of wear-out failures. (5 Ref.; 4 Tab.; 2 Photos).

50.15651

25 years of green chemistry &engineering : Innovations at play, sustainable manufacturing & road ahead. RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6th Floor, B-Wing, Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 62, 23; 2017, Jan., 10; 209-13).

Introduces 2016 as the 25th year of green chemistry and engineering practice. Analyses a macro- and micro-level view of the road travelled so far and the challenging path ahead for ensuring sustainable chemical manufacturing. (5 Ref.; 1 Tab.; 4 Photos).

50.15652

Why investments in chemical projects are not picking up? VENKATARAMAN (NS), (M/s. Nandini Consultancy Center, No. : M60/1, 4th Cross Street, Besant Nagar, Chennai-600 090, India). (Chem. Wkly.; 62, 27; 2017, Feb., 7; 210-1).

Discusses numerous factors that play significant roles for not picking the investments in chemical projects in spite of the implementations of the several proactive policies of the Government of India and the steps taken to promote use of doing business in the chemical industries during the last two years which has been proved as surprising, since there are several favorable factors in India at present that would influence the growth of chemical industries in the country. (3 Photos).

50.15653

Water fabrication chemicals & materials : Market and technology update. (Chem. Wkly.; 62, 22; 2017, Jan., 3; 213-6).

Discusses the increased growth in the computer and information technology(IT) industry that demands new developments and innovations for proper functionality and performance of electronic chemicals & materials at an effective cost. The major trends in this market include miniaturization of the electronic devices, diversification of components with compact packing and integration of advance function in a single device. The Asia-Pacific region dominated in 2015, accounting for over 65% of the global market. Rapid industrialization coupled with increasing urbanization and rising spending consumer capacities in the region are likely to boost demand for consumer goods. The global electronic chemicals and materials market is highly fragmented owing to the presence of many vendors. The market is characterized by the presence of several well-established global, regional and local suppliers. The competition in the market is expected to intensify due to the expansion of product portfolios and technological advances and with increase in mergers and acquisitions(M&As). (1 Tab.; 3 Fig.).

50.15654

L-Lysine : A techno-commercial profile. (Chem. Wkly.; 62, 24; 2017, Jan., 17; 213-8).

Introduces L-Lysine as an alpha-amino acid with the chemical formula HOOC-CH(NH₂)(CH₂)₂NH₂ and as an essential amino acid necessary for human health, but since the body cannot manufacture it, it has to be obtained from food or supplements. Lysine is widely used as nutritional supplements in food and beverage industries and particularly in animal feed. Several derivatives of lysine are used in the personal care and cosmetics industry. It is used also as an intermediate in manufacturing of various organic chemicals. Discusses also that the biosynthesis of lysine takes place only in plants and bacteria through aspartic acid as well as about the manufacture, fermentation, product recovery, product concentration, dyeing and packaging, trends in production, prices and the Indian market for this product in detail. (8 Ref.; 4 Tab.; 5 Fig.; 1 Photo).

50.15655

Polyvinylpyrrolidone : A techno-commercial profile. (Chem. Wkly.; 62, 27; 2017, Feb., 7; 215-9).

Describes polyvinylpyrrolidene as a non-ionic water-soluble polymer and is applied in various viscosity grades as a powder and/or aqueous solution. Discusses the manufacturing, properties, applications, consumption trends, industry players and Indian scenario. (5 Ref.; 7 Tab.; 2 Fig.).

50.15656

Changing scenario of USA propylene : Outlook for producers & buyers. PANDEY (G), (Petrochemical & Fibers Division, M/s. Beroe Consulting(India) Private Limited, ASV Chandilya Towers, Rajiv Gandhi Salai(Old Mahabalipuram Road), Thoraippakkam, Chennai-600 094, India). (Chem. Wkly.; 62, 28; 2017, Feb., 14; 218-22).

Discusses that United States of America used to be a net importer of propylene till mid-2015. However, the emergence of on-purpose has altered the trend. At present, the so-called "by-product" of ethylene is growing stronger than expected. This might eventually help USA in increasing the propylene trade-flow to European Union, thereby reducing the supply crunch in the European market. (5 Ref.; 2 Tab.; 5 Fig.).

50.15657

Indian pharmaceuticals industry : Quest for environmentally safer and competitive supply chain.RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6th Floor, B-Wing, Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 62, 29; 2017, Feb., 21; 217-9).

Discusses the Indian pharmaceuticals industry which currently stands on the cusp of a new era of sustainable manufacturing supply chain and product development. It remains to be seen how it plans its strategies to realize its potential as a vibrant player in the global scene. (2 Ref.; 2 Photos).

50.15658

From challenges to opportunities : Favorable climate for the ASEAN plastics industry. (Chem. Wkly.; 61, 43; 2016, May, 31; 183-6).

Discusses that the plastics industry in ASEAN (Association of Southeast Asian Nation) remains unperturbed by global developments that are also impacting the growth path of key industries. Discusses also the impact of China's economic slump; new trade pacts to boost plastics etc. It is anticipated the ASEAN plastic industry to expand in the coming years and is likely to present significant opportunities for foreign investors. It was revealed that 19% of ASEAN businesses themselves plant to shift investment or business from China into their own region. ASEAN's plastics industry offers foreign investors significant opportunities with the growth of ASEAN countries' consumer bases, broadening of plastic import and markets and expanding foreign trading powers. (3 Photos).

50.15659

Phenol gains likely to be capped by bearish fundamentals in 2016. SAHU (S), NAIR (ES). (Chem. Wkly.; 61, 37; 2016, Apr., 19; 215-6).

Discusses that the phenol market faces weak demand as imports in China fall amid an economic slowdown since the new solvent plants have come online.(1 Fig.; 1 Photo).

50.15660

Demonetization expected to have marginal impact on the fertilizer sales. (Chem. Wkly.; 62, 23; 2017, Jan., 10; 214-6).

Discusses the demonetization, which is expected to have marginal impact on the fertilizer sales. It is expected also that overall, the outlook for the fertilizer sector continues to remain stable with favorable agro-climatic conditions and liquidation of high systemic inventory. (3 Photos).

50.15661

The Indian colorants industry : Riding the export boon. (Chem. Wkly.; 61, 43; 2016, May, 31; 205-10).

It is viewed that India is the second largest producer of dyes and dye intermediates in Asia after China. Discusses the industry structure, trade trends, industry characteristics, environmental challenges, spurt in prices, world demand for dyes & organic pigments to reach \$19.5 billion, Concentration of dyes & organic pigments in Asia-Pacific etc. (7 Tab.; 6 Fig.).

50.15662

Praiseworthy efforts on renewable energy & challenges to sustain momentum.SANGITA GAYATRI (K), (M/s. Nandini Consultancy Center Private Limited, D4, RajendraChola Apartments, No. : 39 TiruvalluvarSalai, Nesappakkam, Chennai – 600 078, India). (Chem. Wkly.; 61, 40; 2016, May, 10; 214-6).

Discusses the challenge which is India's target is facing by considering the involvement of the past track record and complex issues. But a ray of the hope is witnessed through the recent initiatives and performance is 2015-16. The praiseworthy efforts are being made in the financial year 2015-2016 in the various fields of the renewable energy sector in the country in the year 2015-2016(FY16) such as wind power, solar power, Bio-power and small hydro segment. Proposed a challenging target for solar power including the prospects for rooftop solar power projects, unemployed graduates, wind power and the envisaged target for FY17. It is very firmly stressed the importance of not only to start well but keep on doing so till the objective is attained for winning any race. (5 Tab.; 2 Fig.).

50.15663

A new dawn in renewable energy. (Chem. Wkly.; 62, 23; 2017, Jan., 10; 201-8).

Discusses in detail about the several steps that have been taken so far to fortify the Indian Prime Minister's dream of clean energy. The government is aiming to increase share of clean energy through massive thrust in renewables. Core drivers, for deployment and development of new and renewable energy in India, have been energy security, electricity shortages, energy access, climate change etc. (2 Tab.; 2 Fig.; 5 Photos).

50.15664

Investment 'lock-ins' and technological advancements in the energy sector.JAIN (AK), (Energy Division, NITI Aayog, Government of India, New Delhi-110 001, India). (Chem. Wkly.; 62, 26; 2017, Jan., 31; 202-3).

Describes the way in which the technological trends impact energy sector investment as an important question and also asks that should Indian policy makers recognize the winds of change that are sweeping the sector and quickly device a world-class policy regime

that attracts investors? Examines here about two such technological developments such as Electric Vehicles (EV) and solar/wind energy that are bound to influence energy sector investments in positive and negative fashion depending on the sector in question. (1 Photo).

50.15665

CMO/CDMO challenges and opportunities. ROTH (GY), (Pharma and Biopharma Outsourcing Association, No. : 10 Alta Vista Drive, Ringwood, New Jersey 07456, USA). (Chem. Wkly.; 61, 38; 2016, Apr., 26; 216-8).

Describes the various factors that very much influence the size of the global market for Contract Manufacturing Organization and Contract Development and Manufacturing Organizations (CMO/CDMOs) in the dosage from space tend to vary widely, sometimes by an order of magnitude. Discusses briefly about the key trend that is consolidated for the industry among CDMOs, Client demands and regulatory issues of the CDMO. (1 Ref.; 2 Photos).

50.15666

Lessons learned. KOPPANY (J), (M/s. Cidec(Comparative International & Development Education Center), OISE(Ontario Institute for Studies in Education), University of Toronto, No. : 252 Bloor Street West, Toronto, Ontario M5S 1V6, Canada). (Leather Intl; 217, 4860; 2016, May; 44-5).

Looks at where the country viz. : Argentina went wrong in the past and how it can learn from the mistakes, which the country had done in the past to set them correct. This country is looking to regain its foothold in the world leather market with a government change in place and a dramatic shift in sociological and economic policies. (1 Photo).

50.15667

Raise the alarm. GUOLO (A), (Leather Intl; 217, 4859; 2016, Apr.; 18-9).

Speaks about an attempt that is intended to be made for getting an insight into how the effects of the Eastern world's Chinese economic slowdown and Russian sanctions are redefining a new landscape in the World leather industry. (2 Photos).

50.15668

Look to the west. (Leather Intl; 217, 4859; 2016, Apr.; 17).

Reports on the state of trade for the International Council of Tanners(IST) in the US tanning industry.

50.15669

A game of quarters.(Leather Intl; 217, 4859; 2016, Apr.; 14).

Addresses a business overview of the Italian tanning industry and raw material prices for its sector. (1 Photo).

50.15670

Cold chain outsourcing : A simple answer to a complex question? WITHEY (F), (UK Clinical Services, No. : 3001 Red Lion Road, Philadelphia 19114, USA). (Chem. Wkly.; 61, 38; 2016, Apr., 26; 209-13).

Introduces briefly on the cold chain outsourcing. Discusses the side-effects of growth, the outsourcing trend, responses to the changes, initiatives on the parts of the specialists for identifying.Innovative methods for improving temperature-controlled shipping systems; results of the cold chain outsourcing and the longer term development of the Biologics supply chain etc. (2 Ref.; 4 Photos).

50.15671

Malic acid : A techno-commercial profile. (Chem. Wkly.; 61, 38; 2016, Apr., 26; 201-6).

Introduces the Malic acid as an organic compound with the molecular formula. The natural occurrence; production and main reactions; properties; regulatory status, applications in oil field, healthcare, increasing energy and in metal cleaning and electroplating, water treatment, improving color value, painting, copying paper, cellulose inrate lacquers, acrylic fiber etc. Briefly discusses about its market outlook is made and its major suppliers. (4 Tab.; 2 Fig.).

50.15672

Emerging trends in chemical engineering and sustainability education. RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6th Floor, B-Wing,

Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 61, 40; 2016, May, 10; 209-12).

Discusses the relevance of local cultures and its mark on sustainability in a collection of essays on global sustainability. Introduces the new terms and new philosophies in the sustainable chemistry education that involves different methodologies in teaching fundamental chemistry concepts. A need has arized for the introduction of the philosophy of sustainability into all chemistry courses, both at the secondary and post-secondary/tertiary levels. Sustainable chemistry is also multi-dimensional in character, embracing disciplines not normally aligned with it including economics, sociology, environmental, social, health and agricultural sciences. Digital technologies are currently playing a key role in ensuring sustainability in the chemical industry. The future of chemical industry will depend on how chemists and chemical engineers understand the links and synergies between multiple disciplines within the chemical domains and digital domains. (5 Ref.; 3 Fig.).

50.15673

India's foreign trade 2015-2016 : An appraisal. SABNAVIS (M), RANADILIVE (R), (CARE Ratings, M/s. Credit Analysis & Research Limited, 4th Floor, Godrej Coliseum, Somaiya Hospital Road, Off. Eastern Express Highway, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 61, 41; 2016, May, 17; 209-13).

Describes the foreign trade that plays a vital role in the economic development of a country. It is a primary link of integration with other world economics. Attempted to give an overview of India's foreign trade in 2015-16 and its comparative performance over the last year by assuming the significance of India's trade. The analysis has been undertaken for merchandise trade as well as trade in services. Studied the exports and imports from the perspective of composition and trade. In addition, explained the link between merchandise trade and Index of Industrial Production(IIP). (7 Tab.; 2 Fig.).

50.15674

Creation of knowledge portal using latest IT tools-Mobile content delivery system and digital preservation. LATHA (A), (Computer Center, Council of Scientific and Industrial Research-Central Leather Research Institute(CSIR-CLRI),

Adyar, Chennai-600 020, India). (Leather News India; 7, 9; 2016, Apr.; 76-9).

Discusses on the advances in the information technology that have made delivering e-content easier to Subject Experts and to publish on the web with minimal technical skillsand assistance. The development of multimedia e-learning content is no more labor intensive process, requiring a team of web designers and developers responsible for the technical development of the resources, thereby limiting its widespread adoption. Tools such as Adobe Captivate, Camtasia, Snap,Articulate, Lectora etc. provide an easy way of developing e-contents. This exercise has triggered the idea of creating a Knowledge System for an industry, namely Leather Industry. Digital libraries are large organized collection of digitized objects comprising of texts, images, graphs and in technological term referred as "BIG DATA". Well defined digital library software has the potentials to disseminate this information worldwide through internet technologies and the analysis of this BIG DATA is referred as "BIG DATA ANALYTICS". The emergence of worldwide web makes the unprecedeted volume of data freely available to the entire society. This helps in building a knowledge portal. This is an approach paper to illustrate the content development for a few aspects in leather industry taking advantages of tools available and schematic diagram of knowledge portals for industry. (4 Ref.; 2 Tab.; 14 Fig.).

50.15675

Melamine : A techno-commercial profile-Part 1 : Manufacturing technologies, applications and global markets. (Chem. Wkly.; 62, 25; 2017, Jan., 24; 209-12).

Introduces melamine as an organic base and a trimer of cyanamide with 1,3,5-triazine skeleton. Defines its quality and discusses its manufacturing, its applications exclusively in the melamine-based thermosetting resins, except in certain fire-retardant formulations, market trends and the prevailing marketing position for melamine-formaldehyde resins. (13 Ref.; 1 Tab.; 2 Fig.).

50.15676

Melamine : A techno-commercial profile-Part 2 : Indian scenario. (Chem. Wkly.; 62, 26; 2017, Jan., 31; 210-2).

Discusses the import of melamine; its consumption pattern; based classifications into four categories namely

laminates, molding powders, coatings/pigments and adhesives; its growth prospects as well as its demand-supply situation in India.

LEATHER CHEMICALS AND AUXILIARIES

50.15677

Profiles in nutraceuticals - Part 1 :*N*-Acetylcysteine. SHENOY (VR), SHENOY (AR), (Chem. Wkly.; 62, 5; 2016, Sep., 6; 192-4).

Describes *N*-Acetylcysteine (NAC) as a mucolytic and secretolytic agent and is indicated for the treatment of paracetomol poisoning, as well as meant for use as a second line agent for the treatment of acrylonitrile and methacrylonitrile poisonings. Provides the commercial and regulatory information of the product. (23 Ref.; 1 Fig.; 1 Photo).

50.15678

Profiles in nutraceuticals - Part 2 : Allicin and diallyldisulphide. SHENOY (VR), SHENOY (AR), (Chem. Wkly.; 62, 10; 2016, Oct., 11; 213-5).

Describes Allicin, which is otherwise known as a component of extract of garlic and can be prepared by oxidation of diallyldisulphide with m-chloroperbenzoic acid. Provides the synthesis and different uses in hyperlipidemic rabbits and in the hyperlipidemic and hypertensive rats as well as the commercial and regulatory information on it. (18 Ref.; 4 Fig.).

50.15679

Profiles in nutraceuticals - Part 3 : Alpha-Lipoic acid. SHENOY (VR), SHENOY (AR), (Chem. Wkly.; 62, 13; 2016, Nov., 1; 199-202).

Discusses the synthesis and uses of the Alpha Lipoic acid(ALA) which is known also as Thioctic acid. It is widespread in the plant and animal kingdom and can be prepared by the reaction of 6,8-dichloroactanoic acid with sodium disulphide(Na_2S_2). (32 Ref.; 3 Photos).

50.15680

Future of upstream : A techno-managerial challenge. FLOWERS (S), (M/s. Wood Mackenzie, One Park Place, Suite 575, Annapolis, Maryland 21401, USA). (Chem. Wkly.; 62, 27; 2016, Dec., 27; 208-9).

Discusses the challenging times that are currently undergoing by all the industries in general in the universe with special reference to the oil industry. Given the references about the oil industry with its present status in India. (3 Ref.).

50.15681

Industrial applications of emulsion polymerization - Part 2 : Mechanism, processes & types. BOROLE (DD), (M/s. Pidilite Industries Limited, Regent Chambers, 7th Floor, Jamnolal Bajaj Marg, No. : 208, Nariman Point, Mumbai – 400 021, India). (Chem. Wkly.; 62, 18; 2016, Dec., 6; 189-95).

Describes the mechanism, processes and their types such as the semi-continuous(or semi-batch) process, continuous Ab-initio emulsion polymerization etc. Describes also the types of emulsion polymer like oil in water in oil (O/W/O) emulsion system, macro-emulsion polymerization and micro-emulsion polymerization, mini-emulsion polymerization; water-in-oil-in-water(W/O/W) emulsion system, inverse(water-in-oil) emulsion polymerization, film formation of polymer dispersions etc.

50.15682

Industrial applications of emulsion polymerization - Part 3 : Characterization & applications. BOROLE (DD), (M/s. Pidilite Industries Limited, Regent Chambers, 7th Floor, Jamnolal Bajaj Marg, No. : 208, Nariman Point, Mumbai – 400 021, India). (Chem. Wkly.; 62, 19; 2016, Dec., 13; 201-4).

The concluding part of this article describes the characterization and application of the emulsion polymers. (57 Ref.; 7 Photos).

50.15683

Polymerization through Ziegler-Nutta catalysts. MAJUMDAR (S), (Flat No. : H-701, Neel PadmKunj, Vaishali, Sector-1 Opposite to Dabur Chawk, Ghaziabad-201 012, Uttar Pradesh State, India). (Chem. Wkly.; 62, 21; 2016, Dec., 27; 200-1).

Describes the Ziegla-Natta catalysts, named after Karl Ziegler and Giulio Natta, are used in the synthesis of polymers of 1-alkenes(alpha-olefins) such as in the manufacturing of polypropylene from propylene and also two types of catalysts namely Heterogeneous supported



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catalysts and homogeneous catalysts usually based on complexes of Ti(Titanium), Zr(Zirconium) or Hf(Hafnium). The first type of Ziegler-Natta catalyst dominates the industry as well as the history and the stereo-regularity of these two types of the Ziegler-Natta catalysts. (1 Tab.; 2 Fig.).

FINISHING MATERIALS

50.15684

The influence of syntans on the assembly of collagen. FISCHER (F), HAUFE (N), MERTIG (M), (BASF SE, Carl-Bosch-Str. 38, 67056, Ludwigshafen, Germany). (World Leather; 29, 2; 2016, Apr./May; 32-4).

Describes a method that was established for monitoring the assembling of collagen to fibrils with ultraviolet/violet and analyzes its resulting morphology via AFM (atomic force microscopy). A decrease of time lag was found which implied a faster assembly for both syntans, but with no differences in AFM by using two syntans of different chemistry. It was found that an increase in lag time, especially with the polymethacrylate with the two polymers of different chemistry, which also meant a slower assembly. Observed the significant differences in AFM with collagen assembled in the presence of polyacrylate compared to collagen assembled without additive. (7 Ref.; 7 Fig.).

50.15685

Chemistry of stearic acid & its use in the rubber industry. MAJUMDAR (S), (Flat No. : H-701, Neel PadmKunj, Vaishali, Sector-1 Opposite to Dabur Chawk, Ghaziabad-201 012, Uttar Pradesh State, India). (Chem. Wkly.; 62, 15; 2016, Nov., 15; 218-9).

Introduces Stearic acid, which is known otherwise as octadecanoic acid, is a wax-like white powder and is one of the most common long-chain fatty acids. It is found in combined form in natural animal and vegetable fats and is mostly used in the manufacture of several products that include lubricants and pharmaceuticals. Discusses the grades and uses of the stearic acid which are used for plastics, detergents, wax, cosmetics and pharmaceuticals. (4 Ref.; 1 Tab.; 2 Fig.).

50.15686

High-performance acrylic polymer technology. HOEFLER (J), HAGEMAN (B), NUNGERESSER (E), SMITH (R), (M/s. Dow

Leather Solutions, Dow Customer Information Group, Midland, Michigan 48674, USA). (Leather Intl; 217, 4859; 2016, Apr.; 38-41).

Describes the performance properties attributed to a new resin technology through a systematic and statistically driven validation process. (3 Tab.; 2 Fig.).

LEATHER PROCESSING MACHINES

50.15687

Progressive engineering. (World Leather; 29, 1; 2016, Feb./Mar.; 33).

Describes the modified new through-feed samm-setting equipment capable of increasing throughput combined with producing all-round high quality sammed hides. (2 Photos).

SPECIAL PURPOSE LEATHERS

50.15688

Three in one. (World Footwear; 30, 3; 2016, May/Jun.; 20-1).

Discusses the chrome tanning, which is apparently safety for producing shoe upper leathers for well over one hundred years thus paving the ways for developing wet white tanning systems with the combinations of synthetic and vegetable tannins, glutaraldehydes and salts. Discusses also three factors such as metal-free, biodegradable and water repellent as well as the environmental advantages of each and every one of these factors. (4 Fig.; 1 Photo).

50.15689

Split leather-some basic facts. (World Footwear; 30, 2; 2016, Mar./Apr.; 26-7).

Describes some basic facts about the split leather. (3 Fig.; 1 Photo).

LEATHER PROPERTIES. QUALITY CONTROL

50.15690

Studies on the determination of soiling and cleaning behavior of leather-Part 1 :Inter-laboratory test on soiling and cleaning behavior of leather. MEYNDT (R), SCHULZ

(H), (FILK gGmbH, Meissner Ring 1, 09599 Freiberg, Germany). (World Leather; 29, 2; 2016, Apr./May; 25-6 & 28-9).

Examines in detail for the determination of physical and color fastness properties of leather, especially in terms of procedures with the intention of detecting performance characteristics of the procedures and revealing and detecting possible sources of error. The soiling and cleaning behavior of leather and its determination gain in importance due to the trend for light-colored leather for upholstery in the automotive and furniture sector. Selected the procedure VDA 230-212 from the multiplicity of available test procedures for the characterization of soiling and cleaning behavior and considered closely by means of an inter-laboratory test programme. Examined closely each procedural step in the context with regard to their impact on the final result of the test. Part 1 of this article presents the results of the inter-laboratory test on soiling and cleaning behavior of leather. (8 Fig.).

BY-PRODUCTS

50.15691

Lignin based fine chemicals : Research and technology directions. RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6th Floor, B-Wing, Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 62, 18; 2016, Dec., 6; 201-4).

Lignin has gained prominence in the last decade as an emerging platform for diverse high value fine chemicals. It is one of the finest examples of valorization of wastes from pulp and biofuel manufacture. Discusses key research gaps and future research directions in lignin chain. (3 Ref.; 1 Tab.; 2 Fig.).

50.15692

Trace organic contaminants in biosolids : impact of conventional wastewater and sludge processing technologies and emerging technologies. SEMBLANTE (GU), HAI (FI), HUANG (X), BALL (AS), PRICE (WE), NIGHIEM (LD), (J. Hazard. Mater.; 300, 1; 2015, Dec.; 1-17).

Critically reviews the fate of trace organic contaminants(TrOCs) in biosolids, with emphasis on identifying operation conditions that impact the

accumulation of TrOCs in sludge during conventional wastewater and sludge treatment and assessing the technologies available for TrOC removal from biosolids. Elucidates the fate of TrOCs during sludge thickening, stabilization(e.g. aerobic digestion, anaerobic digestion, alkaline stabilization and composting), conditioning and dewatering. Operation pH, sludge retention time(SRT) and temperature have significant impact on the sorption and biodegradation of TrOCs in activated sludge that ends up in the sludge treatment line. Anaerobic digestion may exacerbate the estrogenicity of sludge due to bioconversion to more potent metabolites. Application of advanced oxidation or thermal, pre-treatment may minimize TrOCs in biosolids by increasing the bioavailability of TrOCs, converting TrOCs into more biodegradable products, or inducing complete mineralization of TrOCs. Treatment of sludge by bioaugmentation using various bacteria, yeast, or fungus has the potential to reduce TrOC levels in biosolids.

50.15693

Emission monitoring in the Indian chlor-alkali industry. DAS (H), (M/s. Alkali Manufacturers Association of India, Pankaj Chamber, 3rd Floor, Commercial Complex,Vikas Marg, PreetVihar, Delhi-110 092, India). (Chem. Wkly.; 62, 8; 2016, Sep., 27; 197-201).

Describes the chlor-alkali industry as an important segment of the chemical industry. Chlorine, caustic soda & hydrogen are co-products in a chlor-alkali industry. Sodium hypochlorite, calcium hypochlorite are also generated while neutralizing un-utilized chlorine gas with caustic soda and lime solution respectively. Chlor-alkali units are also producing hydrochloric acid as a by-product. Discusses about only the emission monitoring in a membrane cell chlor-alkali plant as all the chlor-alkali industries are based on membrane cell technology only in India and mercury cell plants have either been closed or converted into membrane cells. (7 Tab.; 4 Photos).

50.15694

Hybrid transesterification and pyrolysis studies on biodiesel production from waste cooking oil and plastic scrap. HARI PRASAD (VP), FAKKRUDEEN ALI AHAMED (A), (Department of Petrochemical Engineering, JCT College of Engineering & Technology, Pichanur Road, Off. : National Highway(NH) 47, Pichanur, Coimbatore-641 105, Tamil Nadu State, India). (Chem. Wkly.; 62, 9; 2016, Oct., 4; 212-4).

Aims for the exploration of the enhanced methods of transesterification and pyrolysis of waste cooking oil and plastic scrap. The laboratory synthesis using plastic waste in a pyrolysis reactor produces bio-oil. The waste cooking oil from hotel industries are subjected to transesterification. The combined bio-diesel from waste cooking oil and bio-oil from pyrolysis are subjected to cracking reaction which yields bio-diesel with excellent quality for using in automobile engines and to synthesize petrochemicals. (5 Ref.; 1 Tab.; 6 Fig.).

WOOL TECHNOLOGY

50.15695

Exciting features with nanotechnology. VERMA (SS), (Department of Physics, Sant Longowal Institute of Engineering and Technology(SLIET), Campus Road, Longowal-148 106, Sangrur District, Punjab State, India). (Chem. Wkly.; 61, 30; 2016, Mar., 1; 213-5).

Discusses the nano-textiles as an emerging and interesting application of nanotechnology which involves dealing with nano fibers at the atomic and molecular levels in order to tweak their properties. (3 Photos).

TANNERY. ENVIRONMENTAL ASPECTS

50.15696

New age technologies reshaping the future of manufacturing-Part 1.RAJAGOPAL (R), (M/s. "Chemical Weekly", Corporate Office, No. : 602, 6th Floor, B-Wing, Godrej Coliseum, Behind Everard Nagar, Off. Eastern Express Highway, K.J. Somaiya Hospital Road, Sion(East), Mumbai-400 022, India). (Chem. Wkly.; 61, 33; 2016, Mar., 22; 201-5).

Focuses on the sustainability in manufacturing which is being driven by way "The Internet of Things (IoT)" technologies and devices are leveraged in manufacturing plants. IoT holds immense promise to rationalize and optimize manufacturing systems, enhance quality, reduce waste through widespread use of data analytics and other digital technologies. The discussion in this part takes a macro and micro level view of many emergent technologies that are poised to write new pages in the history of manufacturing. (1 Ref.; 1 Tab.; 1 Fig.; 4 Photos).

50.15697

Fix up, look sharp. ONYUKA (A), (Kenya Industrial Research and Development Institute(KIRDI), Social Security House, Block A, 17th, 23rd F1oor, P.O. Box 30418-00100, Nairobi, Kenya). (Leather Intl; 217, 4859; 2016, Apr.; 51-3).

Assessed the occupational safety and health management in Kenya's leather sector.Outlined a case study of the country's efforts to clean up its act. (2 Photos).

50.15698

Pollution control and reduction of fossil fuel usage in India by production of fuel ethanol from tapioca.THAMPI (KT), (Chem. Wkly.; 61, 19; 2016, Apr.; 211-2).

Stresses the importance and need on the part of the Indian government to declare tapioca to immediately reclassify tapioca as an industrial product and not as a food product.Discusses the potential, processing, market trends and need for innovation of tapioca which is used for fuel ethanol production.

50.15699

The principle of the matter. BANERJEE (S), (Leather Intl; 217, 4860; 2016, May; 17-9).

Discussed the immediate action required by India to strive for sustainability of the measures for the control of the environmental pollution. (3 Tab.).

50.15700

Cleaner technology core group functioning in Kanpur. (Leather News India; 7, 6; 2016, Jun.; 74-5).

Describes a Clean Technology Core Group that has been constituted by members representing leaching trade associations. Indicates its utility in bringing synergy among the various stakeholders involved in promotion and implementation of cleaner technologies in tanneries and share the knowledge on the results implementation of cleaner technologies. Provides the test of main objectives of the Core Group. (3 Photos).

50.15701

Why industrial accidents have now become too many? VENKATARAMAN (NS), (M/s. Nandini Consultancy Center,

No. : M 60/1, 4th Cross Street, Besant Nagar, Chennai-600 090, India). (Chem. Wkly.; 62, 21; 2016, Dec., 27; 220-1).

Stresses very firmly that most severe and strict enforcements of rules & regulations by government departments must have come to be implemented which will only help in reducing the number of accidents as in the cases of public sector units, legal actions are most rarely and lethargically taken on the culprits who are directly or indirectly responsible for the accidents that are quite often taken place. This is in contrary to the numbers of cases of private sector units the law and order department taken actions when such accidents take place in the private sectors. (1 Photo).

50.15702

UNIDO Kanpur Leather Development Project training programme on cleaner tanning technologies. (Leather News India; 7, 5; 2016, May; 73-5).

United Nations Industrial Development Organization (UNIDO) has been implementing Kanpur Leather Development Project that has been funded by Department of Industrial Policy and Promotions(DIPP), Government of India. A series of tanning programmes were initiated on cleaner tanning technologies under this project. Suggestions and recommendations were made such as the in-house improvement measures like cleaner technologies and adequate pre-treatment of effluent before discharge to common effluent treatment plants(CETPs), which directly address these common issues of the tanneries. Several lessons, which were learned through the training programme, were observed and described each and every one of these lessons. Recommended the cleaner technologies for the tanneries and listed all of them. It is found that these learnings would be used as a baseline for further interventions of the UNIDO project. (10 Photos).

50.15703

Biodegradable plastics and marine litter-Expert reactions to the UNEP report. (Chem. Wkly.; 61, 28; 2016, Feb., 16; 211-6).

Reports the comments of a research consortium which has highlighted the shortcomings in the interpretations, even while stressing the need for more research in the important area of plastics. It is concluded earlier that

the widespread adoption of products labelled 'biodegradable' will not significantly decrease the volume of plastic entering the ocean or the physical and chemical risks that plastics pose to marine environment. (13 Ref.; 3 Photos).

50.15704

A paradigm shift.JOVANOSKI (D), (Leather Intl; 217, 4859; 2016, Apr.; 49).

Looked at the development from BIOSK and how it has taken an innovative approach with its waste management methodology with an advanced R&D department developing technology that is being adopted by several Chinese tanners.

50.15705

Sludge match. SCHULZ (W), (W2O Environment, No. : 58 Cecil Road, Queens Park, Northampton-NN2 6PQ, Northamptonshire, England). (Leather Intl; 217, 4858; 2016, Mar.; 36-7).

Details the challenges of reducing sludge handling efforts and disposal costs. (1 Fig.; 4 Photos).

50.15706

Accident prevention in the chemical industry : Myths & reality. WALAME (NG), (Chem. Wkly.; 61, 47; 2016, Jun., 28; 201-4).

Deals with the tools available to analyze the hazards, evaluate the extent to which they can spread, limit this spread within desired distances to keep safe human life outside this distance. These tools are well developed, highly reliable and need to be used vigorously. Stresses the necessity of protecting the factory from the hazards initiated by its neighbor, even if one decides to relocate the chemical industry away from the locality. So also, one cannot stop people from migrating near to the shifted industry to reduce travelling distance. (1 Fig.).

50.15707

Reactor productivity & safety improvements. NAGESWAR RAO (K), (M/s. Standard Glass Lining Technology Private Limited, Unit 2, Plot No. : 35/A, Svcie, Uppal Road, Hyderabad-500 039, Telengana State, India). (Chem. Wkly.; 62, 6; 2016, Sep., 13; 209-10).

Discusses that reactors are extensively used across many industry sectors and specifically pharmaceutical, chemical, food and fertilizer processing plants. They are designed to safely contain chemical reactions and/or thermal changes of ingredient substances in a pressurized environment, acting in a similar way to a pressure cooker in a domestic household kitchen. (2 Photos).

50.15708

Managing chrome VI. HUBBARD (J), (World Footwear; 30, 3; 2016, May-Jun.; 26-7).

Given the answers to the questions on the management of chrome VI (hexavalent chromium) that very much affect the qualities of leather. Aims at reducing the occurrence of chrome VI related allergic dermatitis from leather goods and it is envisaged that the instance of such reactions will fall by 80% when the regulation is in its place. (2 Photos).

50.15709

Corrosion Management-Chlor-alkali industry looks to preventive & reactive strategies to combat challenges to corrosion. (Chem. Wkly.; 61, 34; 2016, Mar., 29; 210-4).

It is pointed out that the corrosion arises out of the chemical & electrochemical interactions between metal and its environment. Simplistically, corrosion result from the tendency of metals to move towards their lowest energy state-typically the ores from which metals are derived (chlorides, oxides, sulphides etc). The corrosion is compared to wear and tear, but the latter is a mechanical degradation process caused by rubbing or impinging surfaces. Discusses also the impacting factors and their consequences of the corrosion, prevention & protection, Production challenges of the HCl, corrosion in caustic concentrator, Inadequate selection of material of construction, protective coatings, polymer options, role for cathodic protection and corrosion under insulation. (3 Tab.).

50.15710

2T/D bio-refinery plant for the sequential production of bio-diesel, bio-ethanol, bio-hydrogen and bio-methane using leather solid wastes and treatment plant sludge. (Leather Post; 1, 1; 2016, Jun.; 12-3).

Reports the 2T/D bio-refinery plant that has been formed for the sequential production of bio-diesel, bio-ethanol,

bio-hydrogen and bio-methane by using leather solid wastes and treatment plant sludge by Council of Scientific and Industrial Research-Central Leather Research Institute (CSIR-CLRI), Chennai, India.

50.15711

A cleaner environment through ion exchange resins. (Chem. Wkly.; 61, 49; 2016, Jul., 12; 199-202).

Stated that the use of environment-friendly energy sources as a way to prevent air pollution and also to overcome global warming. Describes the IERs (ion-exchange resins) that can be applied to remove impurities from environmentally friendly fuels such as biodiesel (glycerine) and bio-ethanol (Sulphur) or natural gas (mercury). Applications relating to the production of natural gas by anaerobic digestion of organic materials are under investigation. IERs are already in use to produce high-purity silica required for the production of solar panels. Currently they are also under investigation regarding a particular application within fuel cell reactors. (6 Fig.).

50.15712

Zero waste "water-free" chrome technologies. (Leather News India; 7, 9; 2016, Sep.; 83-4).

Describes a process called as the "Waterless Chrome tanning Technology (WLCT)" by the Council of Scientific and Industrial Research-Central Leather Research Institute (CSIR-CLRI), under the 12th Five-Year Plan project namely 'Research Initiative for Waterless Tanning (RIWT)' for multiple benefits relating to in-process abatement of effluent problem, curtailing process steps, complete chromium uptake, huge water conservation, time economy and cost saving. This process has been most successfully demonstrated at three tanneries in Jalandhar Leather Cluster. (1 Photo).

LEATHER PRODUCTS

FOOTWEAR

50.15713

The experimental factory DULIO (S), (World Footwear; 30, 3; 2016, May-Jun.; 29-30 & 33).

Discusses the importance of constructing a factory in a most appropriate way so as it should be most ideal for

erecting any factory specifically leather or footwear factory and provides the suitable guidelines for constructing the factory. (3 Photos).

50.15714

Shoes with soul.(World Footwear; 30, 3; 2016, May-Jun.; 36-8).

Discusses the production of sophisticated shoes so far several years by adding unique twists to classic designs. It manufactures all of its footwear in India, a strategy that more brands could adopt if labor costs in China continue to increase. (3 Photos).

50.15715

Sustainability benefits. HUBBARD (J), (World Footwear; 30, 2; 2016, Mar./Apr.; 36-7).

Outlines some benefits in terms of sustainability that can be gained in footwear manufacturing by the adoption of some of its specialized management systems.(2 Photos).

50.15716

The blue economy - an alternative strategy. PAULI (G), (M/s. Zero Emissions Research, Philadelphia, Pennsylvania 19104, USA). (World Footwear; 30, 2; 2016, Mar./Apr.; 28-30 & 33).

Highlights 100 innovations that could generate 100 million jobs in ten years. It is strongly viewed that for as long as people on earth want the leather and footwear to eat meat, industries will have a strong claim to be a fine example of how the Blue Economy can work, taking another industry's waste material and adding high levels of value to it, while creating employment for thousands of people around the world. (4 Photos).

50.15717

Exporting footwear to Europe-Part IV. ACHARYA (DK), (M/s. Council of Leather Exports, Western Region, STAR HUB, Building 1, Unit No. : 102, 1st Floor, Near Hotel Hyatt Regency & ITC Maratha Sahar International Airport Road, Andheri(East), Mumbai-400 099, India). (Leather News India; 7, 3; 2016, Mar.; 100-2).

Stresses the importance of holding a detailed discussion on 'Sports Footwear Market' which is one of the important

segments. The prospects of long-term growth in the sales of sports footwear are excellent. Sports shoes have become the everyday footwear of choice for children and teenagers. Adults buy sport shoes for recreational activities as well as leisure and causal use, attracted by greater comfort, easy-care features and lower prices in comparison to leather shoes. Sports footwear has proved very attractive to people who spend a lot of time on their feet and to older people with foot problems. (5 Tab.).

50.15718

Ups and downs.(Leather Intl; 217, 4859; 2016, Apr.; 13).

Examined the overall status of China's leather, fur, finished products and footwear industries in 2015 to see how the whole industry chain achieved a steady growth in sales revenue, while it decreased in exports. (1 Photo).

50.15719

Island focus : specialist materials. (Leather Intl; 217, 4859; 2016, Apr.; 15-6).

UK leather looks at the leather industry's performance for 2015 and what this will mean going through 2016 for the UK's leather industry, which comprises of specialist, high-end producers of automotive, upholstery, shoe upper and sole, gloving, chamois, equestrian leather and wet-blue leather. (6 Tab.).

LEATHERGOODS

50.15720

Dancing shoes back in the swing. (World Footwear; 30, 2; 2016, Mar./Apr.; 16-9).

Discusses that the shoes, which were once the most popular and correct ones for dancing and lost their utilities for the said purpose in coarse of time, have again started to occupy their permanent places for the said purposes. (5 Photos).

50.15721

No hiding from digital. SHURLING (R), (Leather Intl; 217, 4858; 2016, Mar.; 31 & 33-5).

Speaks about the digitalization of the leather industry as the global demand for leather is set to continue growing



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and the automotive sector will lead the way. Tanners face increasing pressure to improve yield and still deliver the highest quality. There is an impending sense that the

industry needs a digital revolution to drive the efficiency, quality and time-savings required to meet the demands of car manufacture. (2 Tab.; 2 Photos).

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