Biodiesel from tannery fleshing waste

30 Liters of Biodiesel from tannery fleshing waste was produced in the pilot biodiesel plant at RANIPET Ranitec Vellore District. The produced biodiesel was poured into Diesel Engine of B20 and operated successfully for the first time: reaching out CSIR-CLRI Technology!

Bio Gas Pongal

CSIR-CLRI & Kanchipuram Municipality joint initiative for enhancing Biogas production from Municipal Solid Waste

Pilot Scale Demonstration Plant for Co-digestion of tannery Solid Waste for Biogas Generation at Calcutta Leather Complex, Kolkata
Dear Doyens and Members of the Indian Leather Fraternity; Colleagues from CSIR; Mentors and Teachers, Colleagues and Friends! It gives us great pleasure in sending you our January 2019 edition of The LEATHER POST.

At the outset, we congratulate Shri PR Aqeel Ahmed and Shri Sanjay Leekha for taking over as Chairman & Vice Chairman of CLE, respectively.

The Leather Industry will witness the most important programmes in the calendar of ‘global leather’ events and that is LEATHER WEEK 2019.

CSIR-CLRI will organize a NAM workshop, LERIG 2019, conceptualize and present a Theme Pavilion at IILF 2019, showcase a Trend Wall at the Leather Fashion 2019 and also participate in the 4th edition of Designers Fair 2019. In all these areas, CSIR-CLRI will focus on ‘Greening the Leather’ and approaches towards Industry 4.0.

CSIR-CLRI has been reaching out to the Industry in every sphere with its technologies and services. We hope to live up to the expectations of the Indian Leather Sector at all times.

22nd January 2019

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1. Congratulating the New Chairman & Vice Chairman of CLE
2. “CLRI stands as a global bench-mark for LEATHER”
3. CSIR-CLRI JIGYASA – JAN 2019, KV – AFS, Avadi - (Scientists visit to schools)
4. Ankle foot orthosis for patients with Diabetic Foot Ulcer
5. Hindi Seminar on “Leather Processing, Chemicals & Environment, Product & Testing” held in KANPUR
6. Shri Mukhtarul Amin felicitated at CSIR-CLRI
7. Pilot Scale Demonstration Plant for Co-digestion of tannery Solid Waste for Biogas Generation
8. Many students are interested in seeing how their creativity in design & pattern engineering is translated into a final prototype - A CHALLENGE
9. A strategic approach towards form, design and development of Bikers Shoes for Indian market
10. Design of Vests and Gadget Holders to hold the electronic items being used by the Traffic Personnel
11. CSIR-CLRI & Kanchipuram Municipality for Enhanced Biogas Production from Municipal Solid Waste to “BIOGAS PONGAL”
12. Model survey in Srikakulam and Anantapur Districts in AP in connection with the LIDCAP Project
13. Design Award 2019 ‘Jury Evaluation’ held in CSIR-CLRI
14. CSIR Pavilion at Pride of India Expo, 106th Indian Science Congress
15. Students from Good Shepherd school, Chennai visit labs of CSIR-CLRI
16. Model survey for the Supervisor and Data Collectors in Guntur and Krishna districts
17. LERIG 2019: Programme
Director & Staff of CSIR-CLRI congratulate the New Chairman & Vice Chairman of CLE

Shri P R Aqeel Ahmed
Chairman, Council for Leather Exports

Shri Sanjay Leekha
Vice Chairman, Council for Leather Exports
Dr B Chandrasekaran, Director, CSIR-CLRI greeted one and all a warm and happy New Year 2019. This day, said the Director, “Let us take a pledge to resolve and work harder.”

In his address, Director took stock of what 2018 had offered.

He shared excerpts from the Director General’s views on CSIR (who had spoken a little while earlier and which was telecast live online). The DG stressed upon CSIR working towards the following three aspects

1. Social Responsibility
2. Transitional R&D
3. Fundamental Science and its advancements

CSIR is doing well in all three aspects said the DG.

On the aspect of Social Responsibility, the contribution of CSIR to the Kerala floods was greatly appreciated. Others mentioned were the mobile R.O. plant, the AROMA mission, optical readers, JIGYASA, and the skill mission. Director, CLRI has been nominated to chair funds distribution for skill mission and Jigyasa programmes.

On the subject of Translational R & D, CSIR’s technology for indigenous waxes, small aircrafts, bio-fuels, green crackers, Waterless Chrome Tanning Technology (WLCT) were highlighted. WLCT has given a positive impact on environment for practicing tanners, stressed the Director.

On the subject of Fundamental Sciences, accomplishments in temperature control, non-karyotins, publications addressing respiratory diseases were mentioned.

On the future directions, DG had mentioned about work in areas of: waste to wealth, plastic to fuel, solid wastes to energy. The DG summed-up that the need for CSIR as a whole to meet challenges of Industry 4.0, artificial intelligence and sustainability in manufacturing. This was presented by Director, CSIR-CLRI.

Director, CSIR-CLRI then moved on to highlight the contributions of CSIR-CLRI and presented the ECF for the last five years and he hoped that there was every chance of breaking the records of the previous years. CLRI’s engagement with upgradation of CETP’s, modernization of plants, skill upgradation
programmes, overseas programmes (both leather and metal industry) had shown good progress in Year 2018, he said. Director recalled CLRI’s work done for African countries and mentioned about the MOU signed with Rwanda for developing their leather sector.

Dr B Chandrasekaran, Director, CSIR-CLRI took pride in mentioning that it was for the first time that the CSIR Diamond Jubilee Technology Award won by a CSIR laboratory (won by CLRI) since the inception of the award some twelve years back. And he complimented the Team. Director spoke about the very challenging consultancy programme with the Government of Andhra Pradesh.

Year 2019 seems very promising, he said.

• During LERIG 2019, there would be a NAM workshop with 13 countries participating. The training would be on ‘sustainable technologies.’
• He mentioned about the CLRI’s wok in the Kanpur region. CLRI’s engagement with an NGO to support 50 tanneries with Zero Waste Technologies.
• He was happy to announce that CLRI had initiated work on NABL accreditation for ‘sustainability certification.’
• Director mentioned that ageing infrastructure was being upgraded in the Institute. A 100-bed trainees hostel and a skill development centre are on the anvil, he said.

Director attributed all the achievements to the tireless work of the colleagues.
In conclusion, the Director said that there is a strong need for every one of us to work in tandem and complement each other in reaching our goals and in making CLRI a laboratory to be emulated by others.

May our dreams come true!
As part of JIGYASA program for the year 2018-19 “Scientists visit to Schools” was organized at KV- AFS, Avadi on 8th January 2019. As many as 215 students from KV -AFS, KV- CRPF, KV- HVF and KV- OCF participated in the event. Scientists of CSIR – CLRI from chemistry, biology, physics and engineering sciences delivered science demonstrations in class room mode. The event was coordinated by Dr. V.G.Vaidyanathan and Dr. Md. Sayem Alam of the Institute.

The team was welcomed by Dr. (Smt.) Sundari Krishnamurthy, Principal, KV- AFS with the school scout team. The program was inaugurated by Dr. C.Muralidharan, Chief Scientist, CSIR – CLRI. Shri R. Senthil Kumar, Asst. Commissioner, Regional Office, KVS, Chennai was the chief guest for the function.

Dr. C. Muralidharan while addressing the students expressed that the main focus of the program is to connect school students and scientists and expose the students to research laboratory based learning. He also dwelt upon the R&D activities of CSIR-CLRI and its role in assisting Indian leather industry. He indicated that this program is an opportunity for students to trigger the inquisitive mind and inculcate curiosity. Shri R. Senthil Kumar while inaugurating the program said that Jigyasa is an opportunity for children to interact with scientists. He highlighted that CSIR has been very active in providing technological solutions to the society and common man and hence urged the students to inculcate the spirit of inquisitiveness in order to become more productive and brilliant.
Dr. G.C. Jayakumar demonstrated ‘Eco-Benign Unhairing Process’. He explained the four steps of leather processing viz., pretanning, tanning, post tanning and finishing. The demo provided an understanding towards eco-friendly unhairing method practised in leather making and manufacturing wet blue leather from wet salted goat skin. In a lecture on leather products, Dr. K. Phebe Aaron began with classification of leather products and explained in detail the various unit operations in making the leather goods. She also emphasized the importance of accessories used in products. This was followed by a demo of stitching of coin case using table top stitching machine by Mr. Arunraj.

Dr. Debasis Samanta, on ‘Stimuli Responsive Plastics’ explained the stimuli responsive behavior of the polymers at different temperatures and the application for making it as a ‘drug delivery vehicle’. Dr. V.G. Vaidyanathan, gave a scientific demonstration on ‘Magnetic Levitation’. He interacted with the students and presented the complex theory in a lively and simple way. Students were so excited with the demonstration and raised many questions.

Dr. Md. Sayem Alam explained the science behind the cosmetics preparation/formulation. He presented how two or more immiscible liquids become miscible by using chemicals (emulsifier) to form emulsion and micro emulsions for making cosmetics. He also showed how ‘sunscreen cream’ cosmetics are being prepared. He gave an exposure to the students to familiarize with the composition of cosmetics. Dr. M.S. Kiran demonstrated ‘Isolation and Quantitation of DNA’. He explained the fundamentals of deoxyribonucleic acid (DNA) and highlighted how DNA encodes the instructions for all life process, in the study of heredity and treatment of many diseases, create DNA fingerprints to help diagnosis of genetic diseases, solve criminal cases, identify victims of war and disaster, etc. In his science demo, he also showed isolation of DNA from onion which excited the students. ‘DNA Amplification and Visualization by Agarose Gel Electrophoresis’ was presented by Dr. A Suresh Kumar where he explained the mechanism how the polymerase chain reaction (PCR) makes numerous copies of a specific segment of DNA quickly and accurately.

The program concluded with valedictory function where Dr. T. Narasimhaswamy, Nodal Officer, CSIR-CLRI Jigyasa, gave a short briefing of the event. Dr. (Smt.) Sundari Krishnamurthy, Principal of KV-AFS, Avadi expressed her satisfaction and thanked CSIR-CLRI for meticulous planning of the event. The participation certificates for all the students were distributed. The students, in feedback session said that the program was well executed by the scientists and felt that program was very informative and well organized.
Introduction
Diabetes is one of the major lifestyle diseases which is growing in epidemic proportions through both Rural as well as Urban India. The foot is one of the major organs affected by Diabetic Neuropathy and it is estimated that 25% of all hospital admissions due to Diabetes are relating to complications of the foot. 85% of lower extremity amputations are preceded by a foot ulceration, which provides a portal for infection. Worldwide, there is more than 1 million lower limb amputation procedures performed each year, at the rate of one in every 30 seconds. The accepted etiology of diabetic foot ulcer (DFU) is excessive pressure on the insensitive foot that leads to callus formation, skin breakdown and infection.

Importance of pressure offloading
Bed rest is the most recommended management strategy for the treatment of diabetic foot ulcer because activities like walking and standing will worsen the condition due to frequent loading on the ulcer site. Compliance to rest is poor among patients with DFU. Therefore, reduction in pressure at the site of ulceration, usually on a weight bearing site (plantar surface of the foot) is recommended as one of the interventions for the treatment of diabetic foot ulceration. Off-loading of Peak Plantar Pressures (PPPs) reduces the risk for skin breakdown and allows healing of open wounds. This can be accomplished by the application of a number of external devices. Foot pressures, shock, and shear can be reduced with appropriately fitted orthosis, insoles, and socks. Lack of pressure offloading device is a major problem in India and the provision of scientifically designed and cost effective offloading device would go a long way in reducing foot / lower limb amputation arising from Diabetes.

Available offloading devices
Scotch cast boot, Total Contact Cast (TCC), Instant total contact cast (iTCC), Half shoe, healing sandals, Removable cast walker, Stabil-D device and MABAL shoe are some of the important offloading devices reported in literature and also in practice in western countries. Following are the major disadvantages reported in these devices,

1. Bulky appearance
2. Poor patient's compliance
3. Demand for a trained cast technician
4. Non-access to the wound on a daily basis
5. Difficulty in sleeping position and bathing
6. Difficulty in manufacturing
7. Expensive

One of the effective offloading devices is Ankle Foot Orthosis (AFO). Ankle foot orthosis (AFO) or removable walker has been used as effective method of plantar pressure offloading for treatment of diabetic foot ulcers in persons with diabetes. Among the pressure offloading techniques, AFO offers lot of advantages for physicians and patients. AFO helps patients to ambulate without exerting load/pressure on ulcer sites. It allows physicians to check and treat the ulcers when it is required. It also allows patients to remove it while sleeping. Though AFO has advantages, its pressure offloading tendency is not better than the conventional total contact cast (TCC). Further the current design and materials used for fabrication of AFO make the treatment expensive which is not affordable by the patients in India. The commercially available AFO which is imported by India has number of layers of sole made of various polymeric materials of varying density and hardness. Various foams are used as inner liners for orthosis so that the rigid polymeric parts of the orthosis did not abrade patient’s skin. The anterior and posterior shells of AFO are made separately and held together using Velcro fasteners. Thus the materials and method of fabrication of AFO make the treatment expensive which is not affordable by all the patients. Therefore, design of AFO with the requirements for diabetic patients in India, using indigenous materials and technology is crucial to treat diabetic foot ulcers and improve the quality of life of those patients and the family as well. Therefore, a new design of AFO for patients with diabetes having diabetic foot ulcer was developed by CSIR-CLRI.
Objectives

- To study the gait biomechanics of Persons with Diabetic Foot Ulcer (DFU)
- To design and develop Ankle-Foot Orthosis (AFO) for pressure offloading for faster healing of wound in high risk patients with Diabetes based on biomechanical requirements
- To identify and select indigenous materials and technologies for fabrication of ankle foot orthosis
- To optimize physical and mechanical properties of materials selected for fabrication of AFO
- To study the efficacy of ankle foot orthosis for pressure off loading in persons with DFU

Gait biomechanics of Persons with Diabetic Foot Ulcer (DFU)

The gait changes (that is changes in walking pattern) were observed visually only when it is predominant but the recent technologies like 3D motion capture gives quantified data on gait changes even though they are not visually evident. The causative factors of diabetic foot ulcer are peak plantar pressure, ill-fitting footwear, limited joint mobility and foot deformity. Thus, a biomechanical assessment and correction of abnormal gait can prevent a person with diabetes from amputation. Bio mechanical considerations are of great importance in the healing of foot ulcer.

Type 2 Diabetes Mellitus subjects who are ambulatory in the age group of 50 to 65 years were selected for this study. The inclusion and exclusion criteria of patients and the study methodology were approved by the Institutional Ethical Committee of M. V Hospital for Diabetes and Diabetes Research Centre, Chennai from where the patients had participated in this project. Exclusion criteria included subjects using assistive device for walking, the presence of any lower limb orthopedic disorders, amputation, active ulceration in the foot and sense of pain during data collection. The participants were informed about the study, and their consent was obtained. After the basic examinations, Gait biomechanics was captured using BTS SMART-DX Motion analysis system while AMTI and Kistler force platforms record the ground reaction force simultaneously.

3D Model of Ankle foot orthosis

The prototypes of AFO were developed using indigenous materials. The materials were initially collected from different vendors and tested for its physical properties to understand its quality. The materials which gave proper cushioning and comfort was chosen based on the physical test results and used for developing the prototype.
The ankle biomechanics is vital in walking, and it is found to follow standard ankle mechanics with the use of AFO.

Design analysis and wear trials
The model of AFO was tested by FEA using ANSYS software. The force was applied to the orthosis by fixing the outsole of the orthosis and posterior shell of the device. The force applied was based on the weight of the study subjects in the different risk category. The heel strike and toe off position were also simulated, and the corresponding force was applied to observe the stress and strain during that phase of the gait cycle. The bottom sole was subject to forward heel slip and backward forepart slip analysis in ANSYS as these two movements increase the probability of slip while walking. The sample AFO was tested biomechanically using F-Scan sensor (Tekscan, USA) and Smart DX system (BTS Bioengineering, Italy) to measure the pressure offloading and gait mechanics. The results of three dimensional gait analysis while using AFO shows that ankle moment is improved while using AFO

AFO was designed in such a way that:
• It can be worn either on left or right foot.
• The foot part and the ankle part are moulded as a single piece so that the excess of plantar flexion movement can be arrested.
• The Velcro fastener from the foot part wraps over the dorsal part of the foot so that slipping of foot can be controlled.
• The insole plays the major role in offloading the pressure at the ulcer site. The insole was designed exclusively with three layers of foam in which the middle layer is formed with many holes and the upper layer has projections in its inner side which lock the holes in middle layer. The upper layer is segmented so that each hole of the middle layer is locked by each segment of the upper layer.
• The foot care specialist can remove the segments at the ulcer site so that offloading will take place effectively.

Ankle moment in barefoot and while wearing AFO
Strategy for achievement of pressure offloading and to keep the patient in ambulation by wearing AFO

- **Adequate width**: To accommodate broad foot of patients with diabetes
- **Extra space for toes**: Too material and also to dissipate pressure on forefoot
- **Cushioned arch supports & foot beds**: To provide uniform plantar pressure distribution on walking
- **Foam insoles**: To accommodate bony prominences of metatarsals
- **Extra foam midsoles**: To provide extra cushion and stability.
- **Soles for stability & shock absorption**: To absorb ground reaction force to protect bones of lower extremity.

**The desirable material properties for therapeutic footwear**

- **Biocompatibility**: To be compatible with skin (i.e) that is without any harmful chemicals
- **Light weight and porous properties**: To avoid excessive weight from the shoe material and allow air circulation inside footwear
- **Absorption of shock**: To keep the skin dry and reduce the chance of infection
- **Dimensional stability**: To protect the foot from shock and prevent stress fracture of minute bones of foot
- **Cushioning effect**: To protect the foot from shock and prevent stress fracture of minute bones of foot
- **Biodegradability**: To be compatible with skin (i.e) that is without any harmful chemicals

**Conclusion**

The new AFO design exclusively for patients with severe diabetic foot ulcer and the final product and process of making have been applied for patent in India. Extensive user trials and feedback mechanisms would be employed to further validate the efficacy of the product / technology developed. The developed AFO would significantly reduce the number of foot amputations and help families significantly in reducing their healthcare and hospitalization costs. Moreover, the loss of productivity due to limb loss can also be eliminated. Another outcome would be to arrest the foot complications in the initial stages itself and not allow it to progress to higher levels of risks thereby reducing the burden on the patient and his family as well as reduce hospital admissions.

**HINDI Seminar on “Leather Processing, Chemicals & Environment, Product & Testing” held in KANPUR on 26th December 2019**
On 16th January 2019, Chairman of the Council for Leather Exports, Shri Mukhtarul Amin was felicitated and honoured by Dr B Chandrasekaran, Director, CSIR-CLRI.

The occasion was ‘Jury Evaluation’ of CLE’s Design Award 2019 that was held at the India Fashion Studio, CSIR-CLRI ON 16TH January 2019. CSIR-CLRI took this opportunity to express their gratitude to Shri Mukhtarul Amin, Chairman, CLE for his support and co-operation.

Shri PR Aqeel Ahmed, Vice Chairman and now Chairman, CLE; Shri Javed Iqbal, Regional Chairman (Central Region), CLE; Shri OP Pandey, COA Member, CLE; Shri R Selvam, IAS; Smt Sunanda Santappa, Deputy Director, CLE; Shri P Senthilnathan, Asst professor, NIFT; Shri P Rao, Regional Director (Southern Region), CLE; Shri V Samson, Assistant Director, CLE and Team Shoe & Product Design Centre including Shri Md Sadiq, Shri K Dayalan, Shri D Suresh Kumar, Shri P Vinoth Kumar and Smt R Saraswathy were present on the occasion.
Shri Md Sadiq read a citation as under:

Respected Chairman
Greetings to you Sir!

Let me begin by saying that you have been truly inspirational and have brought a whiff of fresh air in your second tenure as Chairman and we at CSIR-CLRI have been privileged to have been associated with you. Your new ideas and endeavours have helped in the growth of the sector and our Institute has also benefitted by the sagacity you brought in as a Member of the Research Council of CSIR-CLRI.

At every stage you have encouraged us and provided us with innumerable opportunities through the Council for Leather Exports, be it our successive participation in the Colour Club Meetings of the MODEUROP and the Fashion Trend Pool or the outreach programmes in the various clusters of the country including the one done recently in Kanpur.

Sir, your humility and kind benevolence will ever be remembered and our enduring memory of you would be of a fine human being who was soft spoken, kind, passionate, visionary and over all a very dedicated person who took the Indian Leather and Leather Products sector to great heights.

We whole heartedly ‘Thank You’ for being with us each time, every time.

We wish you the very best in all your future responsibilities.

Dr B Chandrasekaran, Director, CSIR-CLRI honoured Shri M Amin with a shawl

Shri PR Aqeel Ahmed, Vice Chairman (then) and Chairman (now) presented a floral bouquet to Shri M Amin

Shri Selvam, Executive Director, IAS Presented the Citation to Shri M Amin
Pilot Scale Demonstration Plant for
Co-digestion of tannery Solid Waste
for Biogas Generation
at Calcutta Leather Complex, Kolkata

CSIR-CLRI implemented a biogas plant for co-digestion of tannery solid waste at Calcutta Leather Complex, Kolkata with the financial Support from Department of Industrial Policy and Promotion (DIPP) New Delhi under Leather Technology Innovation and Environmental Issues - sub-scheme of Indian Leather Development Programme (ILDP).

Plant capacity : 750 kg/day

Plant has been inaugurated on 11th January 2019 by Director CSIR-CLRI with the gracious presence of MSME&T Officials, CLE Officials and CLCTA Members.

The plant has been handed over to MSME&T, Kolkata and CLCTA will Operate and Maintain the Plant. MoU has been signed on 11th January 2019.
CSIR-CLRI, Asia’s largest leather research institute is engaged in imparting knowledge and skills in the product sector as well. There are various training programs along with academic courses imparted at CSIR-CLRI.

In collaboration with Anna University, Chennai, CSIR-CLRI has been conducting the B.Tech & M.Tech courses in leather technology in addition to M.Tech in Footwear Technology.

There were also collaborative programs with BITS, Pilani for conducting a four year Masters course in Footwear Technology previously.

CSIR-CLRI on its own conducts different level programs to cater to the needs of the industry. One year diploma, six months certificate level course, custom made programs for the entrepreneurs, tailor made programs for skill development for various sections of the society.

While there has been every effort to impart maximum knowledge and skills to the different levels of students/trainees, there has been a concerted effort on part of them to observe & learn keenly. Many of the students have gone on to develop a range of designs and have made prototypes.

The basic modules in footwear technology are

- Design & Pattern engineering
- Cutting & Clicking
- Pre-closing & closing
- Lasting & Finishing

Identification of last shape is followed by style lines-free hand sketching of a story board. This story board allows the student to explore the diversity of the surroundings the product is going to experience. Styling involves sketching the lines of the necessary model, be it a formal oxford or a casual pantofola or a semi casual derby. The mean forme is extracted from the designated last and an upper shell is readied after adding the requisite lasting margins. The skills of taping and mean forme preparation are instructed on to the students in a methodical manner- never hurrying up but at the same time maintaining good advancement.

Design & Pattern Engineering
Designing is an art and pattern engineering is skill. A combination of the two is a rarity and hence when it chances upon someone it is the prerogative of the staff/training instructors to nurture such talents. Here at the Shoe & Products Design Centre, that is precisely being fostered.

The course involves identification of last shapes vis-a-vis the prevailing seasons and fashion. Once that is established, range building techniques are inculcated that brings the best out of each student trainee.
Pattern extraction from the upper shell is the next step in which the student is progressively perfected. The making patterns are made as a first step.

The necessary allowances i.e. folding, underlay etc. are explained, chalked out and the cutting patterns are evolved. There is good emphasis on developing the marking patterns too.

Using the upper shell, the lining shell is prepared and the component patterns are extracted in the similar fashion.

As far as the student is concerned he/she is now well versed in pattern generation for a model from a last shape. This is theoretical knowledge as far as pattern engineering is concerned. The student is now aware of the pattern extraction, but then he/she is ignorant of the final product. That lies in the hands of the product prototype developer or the sample maker. The students are further exposed to the sample making techniques, costing and finishing.

**Cutting & Clicking**

Cutting is a foremost operation sequence in footwear manufacturing process. Cutting department plays a vital role in footwear manufacturing. As the economy of the company depends up on the cutting department. The operators and the supervisors of the cutting department should be well trained to perform cutting operation in more efficient manner.

CLRI SPDC cutting department is imparting skills on cutting operations. Trainees exposed to hands on practice of material economy through Pattern Nesting practice and Pattern assessment through Parallelogram methods to find the cutting Norms for various models. They also acquire skills on Machine cutting operations.
Trainees are exposed to the theoretical knowledge of the following aspects such as Quality requirement of the shoe components, Inspection & Quality control measures, Hides and skins, Physical and Visual qualities of leather, Leather area measuring units & measuring techniques, Men & Material productivity, Machines used for cutting operations, Classification of clicking Dies, Automations in clicking operation and Best Manufacturing Practices followed in Cutting Department.

- Practice on orientation of pattern on Leather and non-leather materials.
- Knowledge on non-leather materials use for various components in footwear manufacturing in imparted.

**Pre-closing & Closing**

Cut components of leather or non-leather are collected from the cutting department and prepared for the closing operations.

The students are given instructions of the two step operations in this section.

Pre-closing involves manual & machine operations like checking out the components received from the cutting section. Then, the edges are given some fine touches of the colour known as edge colouring. Necessary reinforcements are collected as per the requirement of the product. Finally, the components are marked for placement. Then they are now taken to the machine section where leather components go through the process of splitting and skiving. These two operations are skipped for non-leather components. The components are now folded as per the instructions given in the sequence of operations chart. It is imperative that the students are taught the sequence of operations. This one discipline will serve a purpose, not only in this section but in all other aspects of product manufacture as well.
The above procedures may sound nonchalant but are the basics. When these operations are done properly there are lesser chances of procedural failures in the manufacturing process.

The students are explained about the various types of machineries in the Pre-closing & Closing section—splitting machines, skiving machines and different types of sewing machines.

The students are taken through a course of explaining the needle system, parts and performances. They are not only stopping there, but going further to learn about the different thread types and stitches.

All these learning are a boon for the students since these cannot be imparted at any industrial houses as hands on training. It is here at this center of CSIR-CLRI that one can get knowledge about such topics. It can be said that this course combines the peripherals of the product industries such as clothing, yarn, mechanical, chemical etc.

Practice makes perfect. Practice with academic knowledge makes one conquer the industry.

LASTING AND FINISHING MODULE

The Lasting and Finishing Module comprises of skills & the students are initially imparted practical training on pre-lasting methods wherein they gain basic confidence on usage of lasting tools and manual practice of lasting. The basic practices like bare-strap, vamp and full strap lasting are the fundamentals imparted to the trainees in this module. The students are given intensive training on all footwear machines especially on fore-part, heel seat and bottom operations.

The students are imparted skills on manufacturing & preparation of unit soles using rubber and sole leathers. The students gain experience on finishing techniques using various upper dressing and bottom finishes for the finished product. In addition, the trainees also imparted theoretical knowledge on various shoe construction methods.

Article by:
L Murugan,
K Gnana Prabhu,
TM Dhanasekaran &
N Govindarajan

Footwear Pilot Plant
Shoe & Product Design Centre,
CSIR-CLRI
Biker’s footwear has always been a high profile product among the racers. India is the emerging automobile market for high-end motorbikes by a significant number of the modern younger population. The Moving body at higher speed against the wind direction causes strain or discomfort to the riders, considering this parameter an attempt was made to impart aerodynamic property in biker shoe with improved safety and comfort. This paper also attempts to derive the aerodynamic relation between the biker footwear & the motorbikes, and its relevance in form, design and functionality of the product. The forms of footwear were inspired by Bio-Mimicry enthused cars as well as trains. The Computer-aided Industrial Design (CAID) tool was used for modelling the surface development obtained from concept sketches. The four developed models were tested under 3D simulations created by Autodesk flow design software and the improvement in aerodynamic properties was inferred using Computational Fluid Dynamics (CFD) analysis.

Finally, it was concluded that the decrease in drag coefficient of biker’s shoe in turn decreases air resistance against the moving body which would prevent the energy loss of riders and hence imparts comfort. Also with the simple changes in the form of shoes especially in the toe to tongue region had imparted the aerodynamic property to greater extent in conventional shoe model. The Model 4 performed well at all the attacking angles such as 30°, 15°, 0°, -15°, -30° respectively; it ensures that this shoe model would suit for majority of the bike model with different footrest.
SPDC, CSIR-CLRI is designing Vests and Gadget Holders to hold the electronic items being used by the Traffic Personnel of Greater Chennai during their day to day activities. In picture: Shri K Karthikeyan and Dr K Krishnaraj are demonstrating the ‘design collection’ to our Director.

Joint MoU Initiative: CSIR-CLRI & Kanchipuram Municipality for Enhanced Biogas Production from Municipal Solid Waste to “BIOGAS PONGAL”

Inaugurated by Dr. B Chandrasekaran, Director, CSIR-CLRI. Presided Over Mr. P Ponnaia, IAS, District Collector, Kanchipuram on 14-01-2019

CSIR-CLRI team have conducted Model survey in Srikakulam and Anantapur Districts in AP on 10.01.2019 in connection with the LIDCAP Project.
Students from Good Shepherd school, Chennai visited SPDC and other labs of CSIR-CLRI on 4th January 2019.

CSIR-CLRI team conducted a model survey for the Supervisor and Data Collectors in Guntur and Krishna districts on 04.01.2019 (Friday) in connection with the baseline survey in Andhra Pradesh for LIDCAP Project.

CLRI Stall in CSIR Pavilion at Pride of India Expo, 106th Indian Science Congress, Jan 3-7, 2019 at Lovely Professional University, Phagwara, Punjab

Design Award 2019 ‘Jury Evaluation’ held in CSIR-CLRI on 16th January 2019

Retirement

Shri JAMES SABASTIRAJ
Lab Assistant (2)
ENGINEERING SERVICES - CIVIL - QUARTERS MAINTENANCE
### Day 1, 29th Jan 2019

**Registration**

**2:00 – 2:30 PM**

**Nayudamma Lecture**
- **Chair:** Dr. Shekhar C. Mande DG, CSIR
- **Orator:** Prof. Ashok Jhunjhunwala, IIT Madras

**2.30 - 3.30 PM**

**Tea Break**

**3.30 – 4.00 PM**

**Welcome address:** Dr. B. Chandrasekaran, Director, CSIR-CLRI
- **Presiding:** Shri P R Aqeel Ahmed, Chairman, CLE
- **Chief Guest:** Dr. Shekhar C. Mande DG, CSIR
- **Guests of Honour:** Dr Rafeeqe Ahmed, President AISHTMA & Chairman FARIDA and Shri Mukhtarul Amin, Chairman, Superhouse Group

### Day 2, 30th Jan 2018

#### Technical Sessions

**8.30 – 9.30 AM**

**Registration**

**9.30 – 11.00 AM**

**Technical Session 1: Futuristic Manufacturing**
- **Chair:** Dr. B. Chandrasekaran, Director, CSIR-CLRI
- **Co-Chair:** Mr. N. Shafeeq Ahmed, Chairman, IFLMEA

- **Shri Ashfaque Ahmed**
  - Managing Director, Farida Group
  - (Yet to confirm)

- **Industry 4.0 – Impact on Leather Sector**
  - **Shri Raja Chidambaram**
  - Director, Urs Productivity

- **“Mass Personalization Production” – Tiny until you turn it on!**
  - **Shri Md Sadiq**
  - Chief Scientist, CSIR-CLRI

**11.00 – 11.15 AM**

**Tea Break**

**11.15 AM – 1.00 PM**

**Technical Session 2: Energy Management**
- **Chair:** Ato Wondu Legesse

- **Indian Energy Scenario**
  - **Prof. S. Iniyan**
  - Professor, Institute for Energy Studies, Anna University

- **Energy Saving Opportunities in Leather Industries**
  - **Mr Milind Chittawar**
  - CEO, SEE-Tech Solutions, Nagpur

- **Role of Artificial Intelligence in Industry 4.0 - Application to Indian Leather Industry**
  - **Dr R C Panda**
  - Senior Principal Scientist, CSIR-CLRI

**1.00 - 2.00 PM**

**Lunch Break**

**2.00 - 3.30 PM**

**Technical Session 3: Water Management and Compliance**
- **Chair:** Dr. S. Sundaramoorthy, CMWSSB

- **Novel Tanning Technology – Deliming, Pickling, Basification free and Water Saving Technology**
  - **Mr. Jochen Rudolph**
  - Technical Director, Asia Pacific Lanxess

- **Trending ZLD Technologies in Leather for Future**
  - **Mr. Silvana Storti**
  - CEO, Europrogetti, Italy

- **Beyond Compliance**
  - **Dr P. Saravanan**
  - Chief Scientist, CSIR-CLRI

**3.30 - 4.00 PM**

**Tea Break**

**4.00 – 5.30 PM**

**Panel Discussion:** Focus on Leather Sector for Future
- Shri R. Selvam, IAS, ED, CLE
- Mr. N. Shafeeq Ahmed, Chairman, IFLMEA
- Mr. K R Vijayan, President, ISF
- Smt. Revathy Roy, FDDI
- Dr. S. Sundaramoorthy, CMWSSB
- Mr. Ato Wondu Legesse, National Co-ordinator, UNIDO
- Dr B Chandrasekaran, Director, CSIR-CLRI

**Vote of Thanks**
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