

The Leather Post

CSIR-Central Leather Research Institute

News you can use



Prof Santosh Kapuria, Director, CSIR-SERC, Chennai holds additional charge as Director, CSIR-CLRI



Prof Santosh Kapuria
Director, CSIR-CLRI

24th May 2019

Dear Doyens and Members of the Indian Leather Fraternity; Colleagues from CSIR, Colleagues and Friends! It gives us great pleasure in sending you our May 2019 edition of The LEATHER POST.

I have been given additional charge of CLRI on 30th April 2019 and I hope that this transition period in CLRI as Director would be short. As Director of CSIR-SERC, I have always appreciated CSIR-CLRI for the plethora of activities being undertaken and CLRI's close connection with the Industry it serves.

This edition of the LEATHER POST carries reports on the visit of the Director General Dr Shekar C Mande's maiden visit to CSIR-CLRI, research activities accepted globally and for presentation at the XXXV IULTCS Congress by at least eight scientists, the selections of the members of the Research Council of CLRI who have made a clarion call for transition of Central Leather Research Institute to Global Leather Research Institute: a rich tribute to this Institution that is strong on its foundation and this foundation is the wealth of knowledge and the opportunity to be associated with the Industry it serves: the Indian Leather Industry.

We at CSIR-CLRI will strive to make this magazine informative and interesting and welcome your feedback for improvement.

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Printed by: **Global Printing Press**

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72nd CSIR-CLRI Foundation Day Celebrations 2019



Dr Shekhar C Mande,
Director General, CSIR has made his maiden visit to CSIR-CLRI on 24th April 2019 and inaugurated various infrastructure facilities like renovated Guest House kitchen, TKDL, KRC and Biological Materials Laboratory of CLRI and laid foundation stone for International Students Hostel facility at CLRI which is to be executed on an approximate expenditure of Rupees Thirty-Seven Crores.

Later on Foundation Day celebrations held at Triple Helix Auditorium, CLRI for which Dr Shekhar C Mande has attended as Chief Guest and delivered BM Das Foundation Day lecture by depicting the achievements of CSIR National Laboratories. Foundation Day Programme inaugurated by Director, CLRI by recollecting the growth of CLRI since its inception.



The following dignitaries have attended the foundation day celebrations:

Guest of Honours from Industry:

1. Shri Habib Hussain, Chairman, LSSC
2. Shri R Selvam, IAS, ED, CLE
3. Shri KR Vijayan, President, ISF
4. Shri Israr Ahmed, Regional Chairman(South), CLE

Special Guests/Invitees:

1. Prof. Alok Dhawan, Director, CSIR-IITR
2. Dr DK Aswal, Director, CSIR-NPL

Programme has concluded with vote of thanks by
Dr MK Gowthaman, Sr Principal Scientist, CLRI.



Dr. Shekhar C. Mande, Director General inaugurated the Traditional Knowledge Digital Library (TKDL) in CSIR CLRI



Inauguration Function of Dr. A.P. Mitra and Dr. G.S. Sidhu Memorial Tournament was held on 24 April 2019 in CSIR CLRI.



Dr. Shekhar C. Mande, Director General inaugurated new facilities at the Guest house in CSIR-CLRI



Dr. Shekhar C. Mande, Director General inaugurated the Knowledge Resource Centre (KRC) at CSIR-CLRI. Knowledge Resource Centre (KRC) at CSIR-CLRI now houses a premium collection in Print-version of over 13,700 Books and 25,000 bound volumes of Journals, Abstracting & Indexing Databases, M. Tech & Ph.D Dissertations and Reports.



*CSIR-CLRI is setting up an International Hostel on campus.
A Boomi Pooja was performed on 24th April 2019.*



*The Biological Materials Laboratory at CSIR-CLRI was inaugurated by
Dr. Shekhar C. Mande, Director General*

Dr. Shekhar C. Mande Director General was the Chief Guest at the 72nd Foundation day celebrations of CLRI held on 24th April 2019. The Director General also delivered the Prof. BM Das Memorial Lecture. The Lecture was well attended by Members of the Indian Leather Industry and the CSIR family.





Report of the Jigyasa conducted during 22-24 April 2019 as part of **Foundation Day Celebrations** of CSIR-CLRI

For the year 2019-20, first Jigyasa program “visit of students to CSIR-CLRI” was held during 22-24 April 2019 in which 235 students and 43 teachers of KV schools from Puducherry, Neyveli and Chennai participated. The event began with the inauguration on 22nd April 2019. Dr. B. Chandrasekaran, Director, CSIR-CLRI while inaugurating the event shared his experience and thoughts on outreach programs of CSIR-CLRI including Jigyasa conducted both at CSIR-CLRI and outside Chennai. He said that CSIR is planning to extend the Jigyasa to Jawaharlal Nehru Navodhaya Vidyalayas. Mr. Ramprasath, Principal KV-CLRI who was guest of honor lauded the efforts of CSIR-CLRI in conducting series of Jigyasa events for the benefit of students. Dr. Manickasamy, Principal, KV-IIT highlighted the salient features of Jigyasa events carried out in the Chennai region by CSIR-CLRI. He said that the students who are part of the Jigyasa are very fortunate as they get the opportunity to interact with scientists and expose to scientific experiments in the form of demo. Prof. K. Ramasamy, former Vice-Chancellor, Tamilnadu Agricultural University gave a special lecture and shared his experience in agricultural sciences and explained the opportunities that exist in the field. He continued his talk in an interactive mode wherein students raised many questions related to the topic for which he provided simple answers.



The scientific demos covering chemistry, physics, biology and leather related experiments were organised for the three day event. The chemistry demonstrations included chemistry of colors, semiconductors nanophotocatalysis, and science of separation. In biology, Gram staining and antibacterial assay, DNA visualization and Foldoscope were identified for demos. In the case of physics, 2D Flow patterns of liquids, Meissner effect and Molecular modeling were covered. Leather related demos included leather manufacturing, leather products and Gait analysis. All the students have been grouped into three batches and the experiments were conducted at different venues of the institute. First day, Leather manufacturing, leather products and Gait analysis experiments were covered in addition to some of chemistry, physics and biology experiments.

The 2nd day of Jigyasa 2019 started with a special lecture delivered by Dr Amalan Stanely, International Institute of Biotechnology & Toxicology, Padappai who is an expert in good lab practices. Followed by the special lecture, the remaining chemistry, physics and biology experiments were covered.

The final day of Jigyasa 2019 started with a special lecture by Prof. R Shankar, The Institute of Mathematical Sciences, Chennai in an interactive mode where students were allowed to ask questions related to modern physics.



In the valedictory function, Dr C. Muralidharan, Chief Scientist, CSIR-CLRI welcomed the gathering and highlighted the Jigyasa activities of the institute. Prof. Alok Dhawan, Director, CSIR-Indian Institute of Toxicology Research, Lucknow, who was the chief guest, delivered an inspirational speech sharing his experiences about the role of motivated teachers in shaping the careers of the students. He said that the Jigyasa provides unique opportunity to students to interact with the scientists which earlier generations missed it.



Report of the Symposium on “Trends in Leather and Leather Products”

The symposium “**Trends in Leather and Leather Products**” was organized as part of CSIR-CLRI Foundation Day Celebrations on the forenoon of April 24, 2019 at Heritage Hall, CLRI. This event was co-sponsored by Indian Leather Technologists Association (ILTA) - Southern Region and Leather Research - Industry Get together (LERIG) trust. Several students and staff of CSIR-CLRI participated apart from significant representation from industrial members. The symposium had e-poster session where the students and staffs of CSIR-CLRI have presented their posters to the participants as well as judges.

The symposium started with **Dr B Chandrasekaran**, Director CSIR-CLRI welcoming the gathering. **Dr Alok Dhawan**, Director, IITR in his special address highlighted the achievements of **Dr Chandrasekaran** in his role as Director CLRI and also felicitated him.

Shri NR Jagannathan, President ILTA-Southern Region delivered the presidential address. He highlighted the need for Indian tanners to look at changing norms with regards to sustainability of leather as a commodity.

Shri. Manoj Bhaiya, CEO C&E Ltd delivered his talk on “**Changing Trends in Leather Chemicals**”. He brought out the new and emerging concept of finishing the leather after it is made into a product. He brought out the advantages of using such a new concept.



Shri Ramesh Babu, Vice president Tannery A. V. Thomas Leather and Allied Products Pvt. Ltd delivered his talk on “**Current Market Trends in Leather and Regulatory Norms**”. He detailed about the norms which are laid down and practiced in leather sector. He also highlighted the current trends in newer types of leathers such as chrome-free shoe uppers for children, hairy suedes with washed look, perforated and woven prints, animal prints, soft sheep shoe nappa for sandals, super soft and light weight natural cow milled leather for bags and shoes, vintage and rugged look leathers and drum dyed natural look crust shoe upper leather finished with shoe creams.

Dr MK Gowthaman, Senior Principal Scientist, CSIR-CLRI delivered his talk on “**ENZYMES – Status and Prospect**”. He highlighted the role played by CLRI in bringing about paradigm shift in biobased leather processing with emphasis on different types of enzymes that are currently being developed and deployed in the leather industry.

Shri Prasanna Kumar Maduri, Campus Manager, Stahl India Pvt. Ltd delivered his talk on “Innovative and Sustainable Solutions – Stahl”. He detailed the Stahl’s efforts towards responsible chemistry, life cycle analysis, combating climate change, leather circularity and the generation Z views on sustainability and leather and how industry is reacting.



After the inspiring talks from experts, Shri NR Jagannathan, President ILTA-Southern Region gave away the Best Poster Awards along with cash prizes to four young researchers. The symposium concluded with **Dr. P Thanikaivelan**, Principal Scientist, CSIR-CLRI delivering the formal vote of thanks.

A P Mitra Memorial Badminton Tournament and Sidhu Memorial Table Tennis Tournament

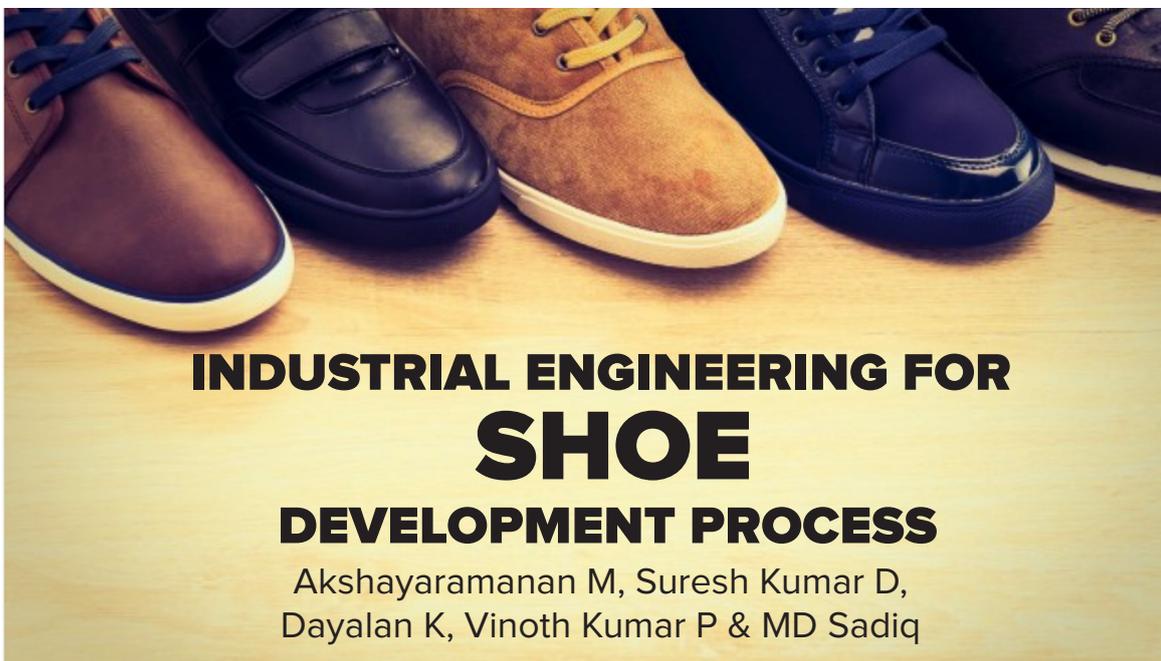
CSIR Sports Promotion Board (CSIR-SPB) organizes all India invitational sports tournaments in different sports events viz., Cricket, Volley Ball, Tennis, Badminton, Bridge, and Table Tennis, in the memory of former Director Generals of CSIR, on a regular basis. Two of these invitational tournaments, namely, A P Mitra Memorial Badminton Tournament and Sidhu Memorial Table Tennis Tournament organized in the fond memory of Dr A P Mitra and Dr G S Sidhu former Director Generals of CSIR, for the year 2019 was organized by CSIR-Central Leather Research Institute (CSIR-CLRI) Staff Club, Chennai, during 24-26 April 2019. About seven teams from institutions such as CSIR National team, IIT – Madras, ISRO, Anna University, B. S. Abdur Rahman Crescent Institute of Science and Technology, CSIR-SERC and CSIR-CLRI participated in the tournament. About 45 players from all over India have participated in the tournament.

A meeting of managers with all the participating institutions was convened on 23rd April 2019 at CSIR-CLRI. Tournament fixtures were finalized during the managers meeting. The meeting was conducted in the presence of Dr Shobhna Choudhary, CSIR-NISCAIR and Mr Ramesh Baura, CSIR-CEERI as observers from CSIR-SPB.



Tournament events commenced on 24th April 2019. The Table Tennis events were conducted at Gymkhana, IIT – Madras. Shuttle Badminton were conducted at the indoor courts at Students Activity Centre (SAC), IIT – Madras. Tournament was formally inaugurated by Dr Shekhar C Mande, Director General CSIR in the presence of Dr Alok Dhawan, President, CSIR-SPB & Director, CSIR-IITR, **Dr B Chandrasekaran**, Director, CLRI and Dr R K Sinha, Secretary, CSIR-SPB.

The tournament events were held between 24th April and 26th April 2019. Dr A P Mitra Badminton tournament consisted of Team event and Individual event. CSIR National Team was the winner of the Badminton tournament and the ISRO Team was the runner. Dr Ashween Deepak Nannaware from CSIR National Team was the Winner of the Individual Badminton Event and Mr Sasi Kiran Reddy from ISRO was the runner. The team event for the Dr G S Sidhu Table Tennis tournament was won by the CSIR National Table Tennis Team and IIT – Madras team received the runner up trophy. Table tennis individual event winner and runner were from CSIR National Team, Dr. Devendra Haware and Dr Pulamte respectively. The runner up for the table tennis doubles event was by Mr. R. Muralidharan and Mr. K. C. Chandrajith of IIT – Madras and the doubles event winner trophy was bagged by CSIR National Team represented by Dr. Devendra Haware and Dr Pulamte. The trophies of Dr A P Mitra and Dr G S Sidhu tournament were presented during the Valedictory programme held at B M Das Hall on 26th April 2019. The trophies were presented by Dr B Chandrasekaran, Director, CSIR-CLRI and Mr Abdul Jabbar, Chief Guest in the presence of Dr B Madhan, Vice President, CLRI Staff Club and Mr N Vasagam, Secretary, CLRI Staff club.



INDUSTRIAL ENGINEERING FOR SHOE

DEVELOPMENT PROCESS

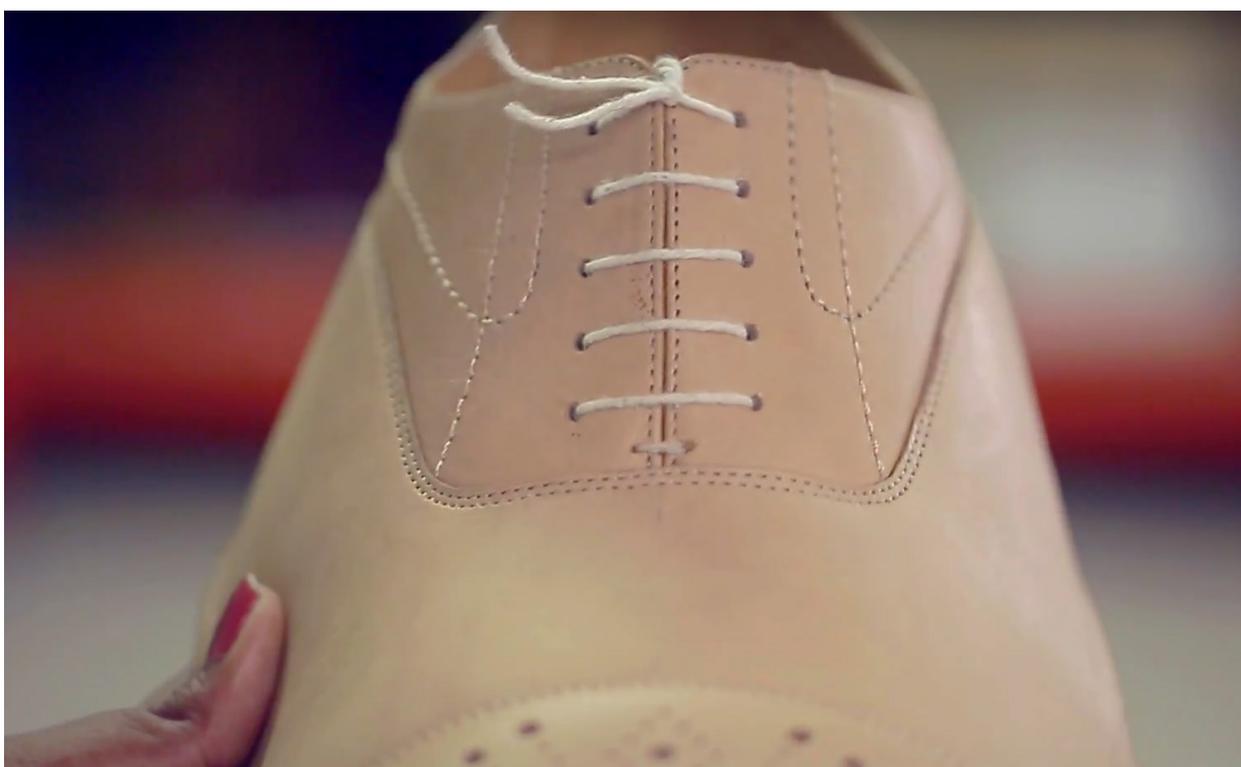
Akshayaramanan M, Suresh Kumar D,
Dayalan K, Vinoth Kumar P & MD Sadiq

INTRODUCTION

Footwear product development plays a very important role and it is a core function of the footwear manufacturing industries. It is the basic tool to prove the capability to make the product as per the customer taste and eventually to come to a business contract. A prototype provided to the customers as per the designs and specification details given by them. This prototype sample under goes many modifications through different stages and the prototype is finalized by accommodating the suggestions and comments from both the customers and the manufacturers.

The Customer wants to know whether the manufacturer is capable of producing the required styles with the desired quality level or not. The prototype sample shows the ability of exporter to deal with any given styles of shoes. The Customer analyzes the capability of the manufacturer only by the samples provided to them. If provided samples are of good quality, price competitive with delivering the sample on time effectively and it tends to attract the customers to place the order to the manufacturer.

Unfortunately, there is no consideration of the time management in sample development process in shoe industries. If the time management is implemented in sample development process, assuredly the certain amount of time can be conserved from it. The conserved time can be utilized to various activities involved in the production and thus gives more time for an effective production. Notably the fit samples and die trial does not require the exact pantone materials and here we can consider the time conservation to complete the process quickly, since the material sourcing time is conserved from these processes.





INDUSTRIAL ENGINEERING FOR SHOE DEVELOPMENT PROCESS

Therefore, the sample development is a very essential process to define an appropriate shape of the product making process and time consumption of product making. Also there is a chance to find out the factors which can reduce the cost of the product in the development stage itself. The standardization of the sample development process will be the tool to construct the process effectively.

OBJECTIVES

- To standardize the product development process to provide more time for the production.
- To analyze the proper time for the material sourcing and sample making.
- To satisfy the customers that the manufacturer can provide the product as per their needs.
- To make liaison with the customer and accommodate their suggestion till finalization of the sample.
- To follow-up pilot production to achieve the better quality as well as the quantity of the product to the customers.
- To maintain a lateral relationship and good communication with the departments such as planning, merchandising, material stores, production and quality assurance team for the effective production.

SAMPLE DEVELOPMENT PROCESSES

1. Proto sample
2. Review sample
3. Color way Sample & Model fit sample
4. Salesmen Sample
5. Fit Sample (Re-Do)
6. Confirmation Sample &
7. Pre-Production Sample (Reference to production)

PROTO SAMPLE: The proto samples are developed with line diagram provided by the customer and made with available or equivalent materials & leathers to validate the style lines.

REVIEW SAMPLE: The review samples are made by incorporating the corrected designs/style lines in different colors. The design/style line corrections are obtained from the proto samples and made with materials prescribed in the specification sheet from the customers.

COLOURWAY SAMPLE: These samples are made with exact materials matching with the pantone shade as provided in the customer specification.

MODEL FIT SAMPLE: The model fit sample prepared with all the considerations and measurements on the last with the materials used for fit sample can be equivalent.

SALESMEN SAMPLE: These samples are made with specified leathers and materials suggested by the customers with specific purpose of showcasing the upcoming styles to customers. It will take more time comparing to other sampling process due to more

quantity. Therefore, the considerations on this sample such as planning, merchandising, and duration for material sourcing and time for making all are noted down for the future reference for the production.

FIT SAMPLE (RE-DO): The fit sample re-do means rework on the sample with the suggestions and comments received from the model fit sample. It will check and analyze by the technically qualified person from the customer side.

CONFIRMATION SAMPLE: The confirmation samples are made with exact leathers and materials with pantone mentioned in the customer specification sheet and also the approved design/style line. This sample has been kept as record and also distributed to production departments as the sample reference.

SUGGESTED PROCESS OF ASSESSMENT OF SAMPLE

Initially the sample development process starts with proto sample by the style lines in line diagram provided by the customers. The designer study and understands the article and develops the line diagram to fulfill the needs of the customer to finalize the style line. Further the colourway samples are made by the exact pantone of the materials and leather with finalized style lines.

The fit sample does not require the exact pantone materials and leathers, it considers only fit of the customer provided style so the available or equivalent materials and leathers are enough to make the fit sample. Before the customer checks the fit sample, it has to be checked internally by external technically qualified people to analyze the actual fit for the shoe sample. So, here the manufacturer can consider the higher concentration to the preparation of the fit sample, because the fit sample has to be checked by the external people as an audit, further the actual fit considerations can be analyzed and determined by this stage.

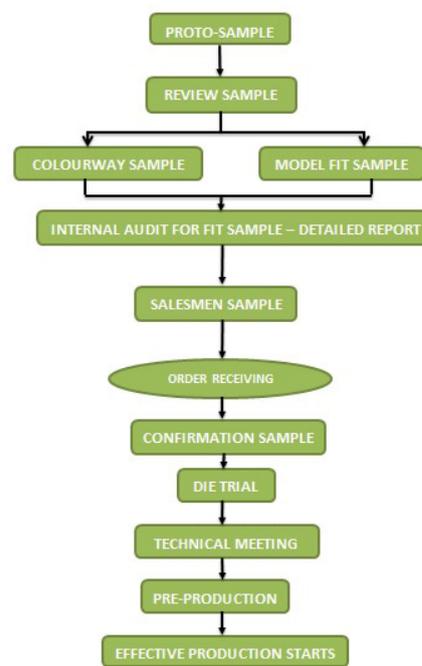
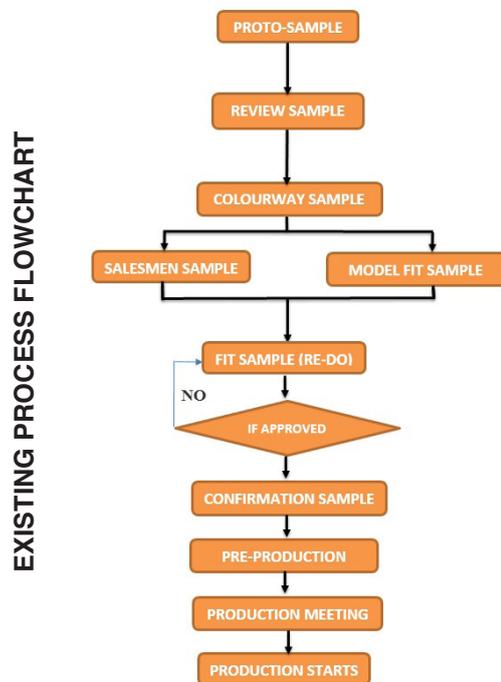
The analyzed reports have to be attached with the fit sample images and it should be sent as a reference for the customer's approval. So the additional inputs from the manufacturer side to the customer, makes ease the process to approve the sample. The submitted reports to the customer can help the cross verification of the fit sample technical considerations to proceed further. Once the fit sample has approved the next stage is confirmation sample for the reference to the production. Further the next stage is pre-production; here the manufacturers should have brain storming meeting for the proper solution of difficulties faced in sample development of the product. The manufacturer should have a pre-planned setup when doing the confirmation sample and the deviations and the problems should be notified and it should be distributed to concerned departments to rectify it. After the reduction of the difficulties of the process, the pre-production has to start up with clear view and the detailed report should be distributed to the production managers and supervisors and the manual errors should be explained



to the workers for the smooth and an effective production.

The processes mentioned below have to be implemented for the efficient sample development and the successful production,

1. Internal audit of the fit sample with detailed report by technically qualified person for the reference to the customer's inspection.
2. Pre-planned setup before starting the pre-production (Die-trial)



The above suggested processes can be achieved by the teamwork of the sample development department and this implementation can be a resource to various activities tends to successful production. The detailed report of the fit sample consists of all the technical specifications regarding the fit required and suggested by the customers.

The fit sample takes the maximum time to complete due to the repetition of the work. Therefore, the fit sample process needs the separate coordinator to analyze the problems and make it as the detailed report for the reference for the customers.

After die-trial stage the technical points have to discuss for the difficulties faced in the process and conduct the meeting like brain storming with qualified persons to determine the solutions for the successful pre-production. The die trial process is used to finalize the patterns but in this concept the processes followed are closely watched and it has to be submitted as report. From the rectifying points discussed in the die trial meeting we can complete the pre-production much faster than existing.

These two stages are essential to implement standardization for the effective sample development process and conserve the time for production.

EXPECTED OUTCOMES

- Time management and standardization in sample development process will tend to an effective work

distribution to production.

- The work repetition of the fit sample can be reduced for the approval from the customer side.
- The time consumption will be the tool to increases the rate of an effective production.
- Internal audit for the fit sample with detailed report provides the more references about the fit sample for the external customer approval
- Pre-Planned activities from the die-trial and pre-production processes provide the appropriate solution for the difficulties in production.
- There is a way to impress the customer by the effectuality of the manufacturers by keeping & maintaining standardization of the sample development data & records.

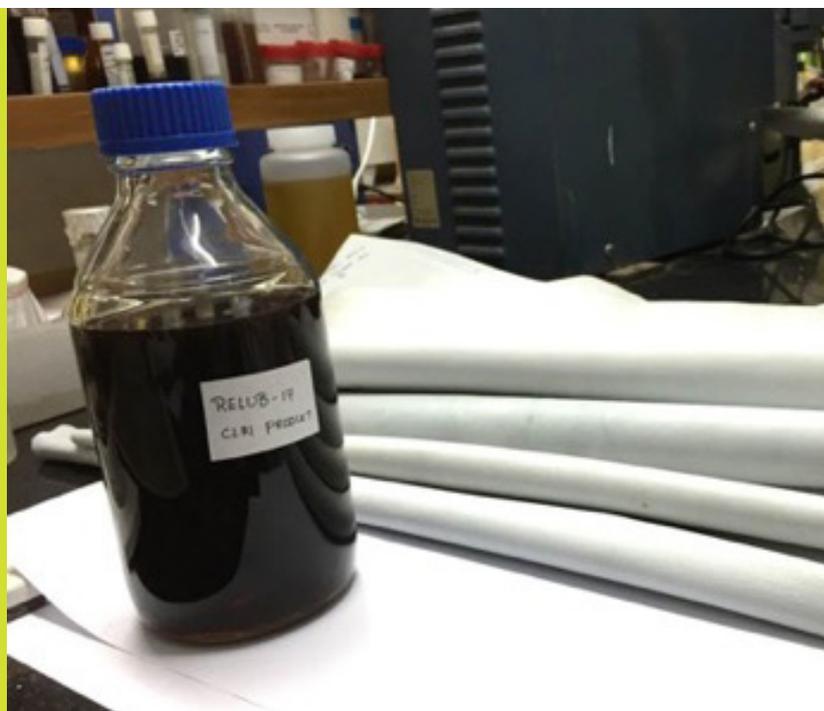
CONCLUSION

The main objective of this concept is to standardize the sample development process and also to minimize the time and deviation in sample development processed finally it tends to increase the rate of an effective production. The main consideration on this concept is to determine the time consumption in each stage of sample development process. The consumed time from the sample development process can be utilized to increase the time for production to achieve the better quality product with increased quantity and also to overcome the difficulties.

RELUB 17

Vegetable oil based retanning cum fatliquoring agent

A product of CSIR-CLRI



RELUB 17 is an eco-friendly and readily biodegradable vegetable oil based retanning cum fatliquoring agent that incorporates excellent fullness and softness properties to leather. Its diversified nature provides the leather with improved softness, suppleness, roundness with a fine grain pattern. Its pertinent light fastness, lubricating cum filling nature allows the user to benefit in a way that utilisation of multiple products can be rounded off to a single product, which will also result in reduced processing time.

RELUB 17 is free of APEO, AOX and does not contain free formaldehyde. It is recommended for use in all types of leathers where fullness, roundness and softness are required.

Area of application

Retanning cum fatliquoring for all types of leathers

Chemical nature

Product based on vegetable oil

Physical form

Amber to dark brown viscous liquid

Characteristic features

- Anionic
- Solids content: approximately 80 %
- pH: 4.50 – 5.5
- Readily soluble in water
- Molecular Wt.: about 1200 Da
- Viscosity: approximately 120 cp
- Compatible with all conventional anionic retanning agents, dyes and fatliquors

Storage

This product has a shelf-life of at least one year if it is stored in its tightly sealed original packaging at temperatures between 0°C and 40°C. Drums should be tightly resealed each time material is taken from them, and their contents should be used up as soon as possible after they have been opened.

Properties

RELUB 17 incorporates following properties when used in post tanning.

- Excellent fullness and round handle with a fine and smooth grain

- Uniform dyeing
- Better penetration and dispersion of other auxiliaries
- Low COD, VOC, Fogging
- Free of APEO, AOX and free formaldehyde

RELUB 17 is fully compatible with all the retanning agents, fatliquors and dyestuffs.

RELUB 17 is suitable for use on all types of leathers including upper, lining, garment, glove and upholstery, where fullness and round handle need to be improved without overloading the grain with better softness characteristics

RELUB 17 is readily soluble in water. The product can be added directly or diluted with water in the processing vessel.

RELUB 17 is readily and uniformly absorbed by the leather and its concentration can be varied from 5 to 20% in post tanning.

During post-tanning 5-20 % RELUB 17

- Excellent fullness.
- Round handle with a fine and smooth grain
- No overloading of grain
- Improved penetration and dispersion of other auxiliaries

Safety

RELUB 17 is a very safe eco-friendly retanning cum fatliquoring agent with better biodegradability and has low contribution towards pollution load to the environment.

IULTCS selects over eight papers from CSIR-CLRI
for oral presentation at the **XXXV IULTCS Congress**
slated for 25-28 June 2019 in Germany
Papers from CSIR-CLRI focus on "Science & Sustainability of the Leather Industry"

XXXV
IULTCS CONGRESS
DRESDEN 2019



XXXV IULTCS Congress 25-28 June, 2019 GERMANY | DRESDEN

Congress theme 2019: Benign by Design

Leather – a future through science and sustainability

Benign by Design is the overriding principle in many green chemistry and sustainability initiatives. We decided to choose this meaningful term as the main slogan even for the XXXV. IULTCS congress, because it exactly points out how we believe research and development should be characterized. Modern chemical solutions should aim to end deterioration of the environment - this needs to be a clear message to the scientists.

Leather as a substrate has the potential for an ultimate sustainable material! It's all a matter of design - Chemists need to design now next generation leather chemicals, that on one hand they still provide a high technical performance in their respective application, but that on the other hand they can be applied in a sustainable process and only survive in leather as long as it is providing its necessary function; afterwards they should be either recyclable for other use, or can biodegrade in a reasonable time in a bio system without resulting in harmful intermediates and final substances.

A future through science and sustainability: In the past, chemicals have been designed for its application purpose mainly. Products were developed to strive for high and long-term performance in use. There was the believe that a long durability of molecules is always an important and positive criteria. In contradiction future concepts for sustainability need to be built on a full life cycle perspective. Bioaccumulation and contaminations of our environment with non-natural and even hazardous substances have been identified as a big issue for the biological systems of our plant and the health of all living species.

Many scientists today already think that way and need to be encouraged to share their views. The congress should provide a perfect platform and opportunity to communicate latest achievements as well as new conceptual thinking. Delegates should get inspired to go home afterwards with new project ideas for sustainable chemical/technical solutions.

A glimpse of the papers selected from INDIA:

Automatic Leather Species Identification using Machine Learning Techniques

M. Jawahar¹, S. V. Kanth¹, V. Rajangam¹, T. Selvi¹
1 Central Leather Research Institute, Leather Process Technology, Chennai, India

Identification and classification of leather species becomes valuable and necessary due to concerns regarding consumer protection, product counterfeiting, and dispute settlement in the leather industry. Identification and classification of leather into species is carried out by histological examination or molecular analysis based on DNA. Manual method requires expertise, training and experience, and due to involvement of human judgment disputes are inevitable thus a need to automate the leather species identification.

In the present investigation, an attempt has been made to automate leather species identification using machine learning techniques. A novel non-destructive leather species identification algorithm is proposed for the identification of cow, buffalo, goat and sheep leathers. Hair pore pattern was segmented efficiently using k-means clustering algorithm Significant features representing the unique characteristics of each

XXXV
IULTCS CONGRESS

species such as no. of hair pores, pore density, percent porosity, shape of the pores etc., were extracted. The generated features were used for training the Random forest classifier.

Experimental results on the leather species image library database achieved an accuracy of 87 % using random forest as classifier, confirming the potentials of using the proposed system for automatic leather species classification.

Take-Away

Novel technique to identify leather species

Non destructive method

Machine learning algorithms to automate leather species identification

A Protein based Polymeric Syntan from Leather Waste: Retanning agent for Sustainable Leather Processing

J.Kanagaraj*, R.C.Panda, R.Prasanna & M.Javed

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Abstract

A copolymer has been synthesized from leather waste and monomer and its application has been studied for improved exhaustion in tanning and post-tanning processes. After synthesizing, the product has been analyzed and found to have particle size of 810 nm, pH of 4.0, relative viscosity of 0.8872 cp, polydispersity index (Mw/Mn) of 0.555 and percent solid as 23%. The weakly anionic character of the co-polymer is supported by zeta potential of -0.0403 mV. The stability of the particle was also studied using TGA, DSC. Functional groups of the polymer was analyzed by FT-IR which revealed the presence of carboxylic acid, amide I & II, hydroxyl groups and ester groups in the product. The product can be used for increasing exhaustion and leather-properties in chrome tanning and post-tanning processes. It improves belly filling, provides fullness, softness and dye exhaustion in post-tanning process. It also shows better fullness and body in chrome tanning processes. The color properties found to be better and strength properties were comparable in experimental leather as compared to conventionally produced leather. This product can be applicable for manufacturing different types of leather where fullness and tightness are necessary. The present process helps in mitigating pollution problem of liquid and solid wastes of leather industry. A cost benefit analysis shows that the process is feasible for up-scaling.

Key words: Leather waste, polymer, tanning & post-tanning aid, organoleptic properties, abatement in pollution.

Enhancing performance properties of conventional leather finishing topcoat by incorporating metal oxide based formulations

S. Gupta², R. Kothandam², S. K. Gupta¹

1 Shiv Nadar University, Greater Noida, India

2 CLRI, Chennai, India

Content

ZnO nanoparticles were developed by 1:2 ratios of Zinc sulphate heptahydrate and Sodium hydroxide by using precipitation method. The structure, morphology of ZnO nanoparticles were investigated by using X-Ray Diffraction, Scanning Electron Microscopy and Transmission electron Microscopy. X-Ray Diffraction confirms the formation and average crystallite size of ZnO nanoparticles. Scanning Electron Microscopy studies shows the ZnO nanoparticles were in spherical in structure. These ZnO nanoparticles were used in different ratios along with conventional finishing formulations and coated on the leather surface. The performance properties such as water fastness, rub fastness and flexing resistance were evaluated. Application of ZnO nanoparticles in leather finishing showed significant improvement in overall performance properties than conventional finishing formulations. XRD confirms the formation of ZnO nanoparticles (wurtzite structure) at 36.67° (101) plane and the particles size was in the range of 43 nm. SEM image shows that the particles are in the spherical structure whereas EDAX investigate the stoichiometry and chemical purity of the samples to confirm the presence of zinc and oxygen. Optimum quantity up to 2-5 g/L of the solution of ZnO nanoparticle is desirable for upgrading the value of leathers by improving color fastness to water, rub fastness and flexing resistance (wet & dry) properties significantly in cationic (wet), NC lacquer emulsions and PU top coat dispersions in finishing formulations.

Take-Away

Optimum quantity up to 2-5 g/L of the solution of ZnO nanoparticle is desirable for upgrading the value of leathers by improving color fastness to water, rub fastness and flexing resistance (wet & dry) properties significantly in cationic (wet), NC lacquer emulsions and PU top coat dispersions in finishing formulations. ZnO nanoparticles, Leather finishing, Formulations, Performance properties

Recycling of Leather Solid Waste as Shoe Soling Material

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Content

Leather manufacturing involves discharge of large quantities of solid and liquid wastes. While efficient

recycling methods and in-plant controls have considerably reduced the discharge of obnoxious liquid streams, satisfactory methods to the solid waste management still elude the leather manufacturers. Land-filling is an easy option for the disposal of solid wastes like chrome shavings and trimmings, but is subjected to stringent environmental regulations because of the presence of chromium in these materials. Considerable efforts have been made to recycle the chrome containing wastes by methods such as incineration, pyrolysis and alkaline or enzyme hydrolysis. These recycling processes, however, are seldom complete without further environmental problems. Unfortunately, in such recycling processes the inherent fibrous structure of these materials gets completely destroyed. Applications based on the fibrous nature of the shavings and trimmings are presently limited but various possibilities are being explored continuously. An efficient way of utilization of these fibrous waste materials may be to combine them in a suitable form with synthetic polymers to give composite materials. Short fiber reinforcement of polymers is an important area in polymer composites where both synthetic and natural fibers are effectively used.

Footwear has become a basic necessity like food, shelter and clothes. Soles are bottom components of footwear and some important polymeric materials used in footwear fabrication are last, soles and Insoles. This research aims at reducing the solid waste (Chrome shavings) generated by leather industry and reusing them as low cost shoe components such as soles and insole material. In this research, the footwear components were prepared using chrome shaving (tannery solid waste), EPDM (ethylene propylene monomer rubber) and isoprene rubber with different inorganic oxide/hydroxide nano particle based fillers. In this study, soles are prepared by using strap cutting machine, two roll mill and compression moulding machine. The soling materials made characterised using FT-IR and SEM and tested for mechanical properties.

Due to good mutual compatibility between Isoprene, EPDM and leather fibre with inorganic nano clay based fillers, the composites are well in terms of all the physic-mechanical behaviours like hardness, density, abrasion resistance and grain crack suitable for shoe sole application.

Take-Away

1. Ethylene propylene monomer rubber and leather fibre with inorganic nano clay based fillers, the composites are well in terms of all the physic-mechanical behaviours like hardness, density, abrasion resistance and grain crack suitable for shoe sole application.
2. An efficient way of utilization of these fibrous waste materials may be to combine them in a suitable form with synthetic polymers to give composite materials.

Short fiber reinforcement of polymers is an important area in polymer composites where both synthetic and natural fibers are effectively used.

Recycling, Leather, Solid waste, Shoe sole

BIOPOLYMER-LIPOSOME COMPOSITE FOR FATLIQUOR APPLICATIONS- A 'GREEN' APPROACH TO OPTIMAL TRANSPORT AND DELIVERY OF NATURAL OILS

Narayana Reddy Gari Bhargavi¹, Kalarical Janardhanan Sreeram¹, Aruna Dhathathreyan²

Fatliquor – a product of chemical modification of oil along with surfactants that enhance the dispersion of oil in water are today attracting attention on account of the presence of substances classified as restricted under REACH stipulations. While short term measures such as avoidance of such chemicals can be adopted immediately by the chemical houses, this paper provides another dimension to the solution, viz., exploring the possibilities of using nanocarriers such as liposomes for transport of oil through the skin matrix rather than through water medium. Lacunae associated with liposomes such as stability, encapsulation efficiency, release of cargo under desired conditions have been addressed. Through various design strategies an egg phosphatidyl choline – pectin (lipid – biopolymer) composite has been developed to carry oil. The composite properties have been tuned to release oil cargo in a pH sensitive manner, i.e. around 3.0 – 3.5 (as in conventional leather processing). The oil carrying composite has been evaluated against conventional fatliquors and found to provide moderate to good lubrication. The liposome – biopolymer composite developed in this study thus holds a futuristic promise as a carrier for oil into the fibre structure of hides/skins without the need for chemical modification of oil. The lipids and biopolymers are biodegradable and biocompatible (as they are used in drug delivery systems as well).

Sound absorbing nanofibers from tannery solid waste: Trash to treasure

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Abstract

Leather processing results in the generation of enormous amount of solid waste. Preparation of value-added materials from leather waste is one of the approaches, which can reduce the pollution burden and also have a significant positive impact on the leather economy. In this present study, we have developed

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a new method for preparation sound absorption nanofibers from two solid wastes viz., fleshing waste and crust leather waste. The limed fleshing waste and crust leather waste were hydrolysed in both the acid and alkaline conditions. The hydrolysate was blended with the acoustic polymer poly(vinyl alcohol) and electrospun for the preparation of nanofibers. The nanofibers were further placed on the natural sound absorbing materials and their sound absorbing ability was investigated using impedance tube method. The nanofibers were also prepared using layer by layer assembly where the leather hydrolysate- PVA nanofibers sandwiched between polyacrylonitrile nanofiber layers and their properties were studied. The nanofibers were subjected to morphological, thermal and mechanical characterizations. The diameter of the nanofibers were found to be around 100- 200 nm. Hydrolysate- PVA nanofibers showed enhanced thermal stability than the neat PVA nanofibers. The specific surface area of the hydrolysate- PVA nanofibers were found to be 2.97 m²/g. The bilayer material consisting of hydrolysate- PVA with natural fiber coir showed better sound absorption ability when compared to the coir alone. The triple layer material consisting of PAN- hydrolysate PVA- PAN showed better sound absorbing potential when compared to the PAN layer. Thus, this study paves way for developing a new strategy for managing the leather wastes as “wealth from waste approach”.

A Novel Preservation-cum-Unhairing Process for Sustainable Leather Manufacturing: An Unconventional Approach in Leather Making

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Preservation (or) curing is an important unit process for transportation and storage of raw hides/skins without any deterioration. Popular preservation process is mostly achieved by reducing the moisture content of hides/skins using common salt (NaCl). Usage of salt in preservation process leads to generation of large amount of contaminated salt, total dissolved solids (TDS) and consume huge amount of water for subsequent rehydration step. On the other hand, lime-sodium sulphide based reductive process is commonly employed for the removal of hair from hides/skins. This process leads to generation of lime sludge and possible evolution of toxic hydrogen sulphide gas thereby making the working atmosphere more unpleasant. Several alternative techniques for preservation as well as unhairing process have been developed individually to replace salt and sulfide, respectively. However, a single compound performing dual functions such as preservation and unhairing action in neutral pH conditions has not explored so

far. In the present work, a novel formulation has been developed, which possess the both preservation and unhairing potential, and applied on the hides/skins for storage up to 6 months at ambient conditions without dehydration. Low level of sulphide was used during alkaline fiber opening for complete removal of hair. The strength and organoleptic properties are on par with salted skins/hides. The developed process completely eliminates the use of salt and 75% sulphide and also reduces the time and water required for soaking process. The developed system reduces 85% of pollution load discharged from soaking and unhairing processes.

Keywords: Salt-free, Less-sulphide, Preservation, Unhairing

High Exhaustion System (HES) for leather process: Role of biocatalyst as an exhaustive aid for wet-end

G.C. Jayakumar and V.Karthik

Application of biocatalyst becomes an imperative due to their eco-friendly advantages. Enzymes in pretanning for unhairing, fiber opening, defleshing and bating are well reported and practiced. However, the role of enzymes as a chemical aid is less explored and consider as secondary applications. Leather enzymes are known for their hydrolytic behavior which makes it more suitable for pretanning operations. However, typical chemical exhaustive aids acts as a vehicle for the diffusion of chemicals, whereas enzymes aids in the splitting of fibers which facilitate the diffusion of tanning and post tanning chemicals. In this research, pickled pelts are treated with acid protease and subsequently tanned using chrome tanning agent. Enzymatic treated pelts resulted in better uptake of chromium as compared to conventionally processed leathers. Similarly, after neutralization, chrome tanned leathers are treated with alkaline protease to conventional post tanning has been carried out. Enzymatic treated wet blue leathers showed high uptake of post tanning chemical, uniform dyeing and reduction in the pollution load. From the preliminary research, an interesting finding has augmented that application of enzymes at an optimized concentration would lead to better uptake of chrome which reduces the pollution and minimize pollution load in post tanning. This study, emphasize on the application of enzymes in tanning and post tanning for diffusion of chemicals.

SNIPPETS

RCED Kanpur, CSIR-CLRI has conducted the assessment for trainees of skill development program under NSFDC at CFTI, Agra



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Shri ABDUL KHALEEL A
Sr. Technician(2)
ENGINEERING SERVICES -
WORKSHOP

CSIR-CLRI made a theme presentation on Biogas into Bottling fueling Cars and Buses using Municipal urban Organic Solid waste for the Corporation of GOA on 10th May 2019. Organised by GIZ, TERI and GOA corporation.



Preparation of DPR For Building Large Scale Business Model Biogas Bottling Plant for the Anaerobic Co-Digestion of Tannery Sludges Solid Waste with Food Waste And Vegetable Waste to Operate Self Sustained Vechicles in Tata Dewas.

A MoU between CSIR – CLRI, Govt. of India and TATA International Limited, Dewas, Madhya Pradesh was signed for the preparation of Detailed Project Report to build large scale Bio gas bottling plant at TATA International Limited, Dewas, Madhya Pradesh for the production, purification and bottling of Biogas plant using an anaerobic co-digestion of Tannery Sludges, Solid Waste with Food and Vegetable Waste to operate self-sustained vehicles in TATA, Dewas, Madhya Pradesh.

TATA International Limited [TIL] is a global trading and distribution company with a network of offices and subsidiaries spanning more than 39 countries in Africa, Asia, Europe and the Americas. As a member of the reputed business conglomerate the TATA Group, with the highest ethical standards in Leather businesses. Supported by a 7000+ strong employee base, TATA is strongly driven by customer centricity, and have, over the years, formed strategic alliances and partnerships with market leaders that have reinforced our role as preferred partners in international trade and business.

TATA secured worldwide revenues of US \$2.32 billion in FY18 have set their firmly on a path of sustained growth even as we continue to focus on value-added offerings for their customers, backed by strong compliance of global norms within the sectors in which TATA operate. TATA leverage their worldwide presence along with sourcing and marketing competencies to deliver what TATA promise to customers across their five key business verticals.

TATA is India's leading exporter, manufacturer and supply chain integrator of leather and leather products with exports to over 35 countries. TATA's diversified product basket comprises a large range of footwear, finished leather and garments, all of which reflect contemporary trends in design and colour palette.

TATA operate India's only performance leather facility. TATA's quality and customer orientation have helped to build enduring associations with major global brands like Marks & Spencer, Gabor, Aerosols, Zara, Mango and others.

TATA state-of-the-art manufacturing facilities in India (Chennai and Dewas) and development centres in China and Portugal, besides a design studio in Italy put TATA ahead of their peers in terms of capabilities and the breadth of our offerings. TATA is also the largest exporter of children's shoes from India and have a major stake in Move-On Shoes, a leading Portuguese footwear retailer.

The main aim of the project is to use the entire solid waste available in TATA together with organic fraction of Municipal Solid Waste (MSW) like Hotel Waste, Vegetable Waste, Kitchen Waste to be used for the enhanced production of Bio Gas and Bio CNG. The MoU also aim to prepare a detailed Engineering Drawing Planning with Design for the purification and bottling of above biogas to Bio CNG Cylinder to be used in the Cars and Buses in TATA, Dewas. This is the first large scale biogas bottling plant for the management of Leather and Domestic Solid Waste integrating small industries and smart cities at Dewas, Madhya Pradesh in India.

This biogas bottling project from Leather and other Municipal Solid waste (MSW), organic solid waste and effective automotive utilization is through the concept of "Waste into Wealth" or "Waste into Wheel". This would benefit the entire Leather Industry in India to replicate Biogas bottling plant to achieve Zero Solid Waste Discharge (ZSD) coupled with energy generation economic value addition besides environmental protection. This bio gas bottling project would pave a path for fueling the Bio CNG Cars and Buses in TATA, Dewas similar to CNG in Delhi that will enhance the production capacity of Biogas Buses and Cars in the country. This efficient Solid Waste Management is aimed not only to produce Bio-CNG but also to minimize the numbers of Dengue, Malaria and Typhoid causes in India upon open dumping besides curtailing the emission of Green House gases like CO₂, CH₄ and Climate Change that will avoid the Natural Calamities like Tsunami, Global Warming in near future.



Know your Director



Prof. Santosh Kapuria, PhD, FNA, FNASc, FNAE

Academic Background:

- 1 1985-1989: B.C.E. (Civil Engg.), Jadavpur University, Kolkata – First Rank in the Department in all Eight Semesters.
- 2 1989-1991: M.E. (Structural Engg.), Indian Institute Science, Bangalore – First Rank among all M.E Programmes in the Dept.
- 3 1994-1997: Ph.D. (Applied Mechanics), Indian Institute of Technology Delhi – Thesis Adjudged Excellent (17 Journal Papers out of Ph.D. Thesis).

Professional Background:

Since Dec. 2015	Director, CSIR-SERC (on hen from IIT Delhi)
Nov 2006 - Dec 2015	Professor, Dept. of Applied Mechanics, IIT Delhi (Rajat Gupta Chair Professor since May, 2011, Senior (HAG) Scale since July, 2013)
Dec. 2009-July 2010	Fulbright Senior Research Fellow, Dept. of Mechanical Engg, Division of Mechanics and Computation, Stanford University, USA
Sept 2002 - Nov. 2006	Associate Professor, Dept. of Applied Mechanics, IIT Delhi
Dec. 2005 - Nov. 2006	Humboldt Senior Research Fellow, Institut für Mechanik, Technische Universität Darmstadt, Germany
Nov. 1991- Sept 2002	Engineer/Sr. Engineer/ Deputy Manager, Engg. & Tech. Development Dept., Engineers India Limited

Areas of Scientific Interest:

- Smart Composite and Sandwich Structures, FGM Structures
- Damage Detection and Structural Health Monitoring
- Active/Semi-Active Control of Structures, Finite Element Analysis
- Computational Structural Mechanics
- Offshore Pipelines & Structures, Mounded Storage Vessels, Pressure Vessels and Buried Piping
- Biomechanics

Distinction / Awards:

1. J. C. Bose National Fellow (2018)
2. Fellow, Indian Academy of Sciences (FASc)
3. Fellow, Indian National Science Academy (INSA)
4. Fellow, National Academy of Sciences, India (NASI)
5. Fellow, Indian National Academy Engineering (FNAE)
6. Rajat Gupta Chair Professorship at IIT Delhi - May 2011 to Dec. 2015.
7. Editorial Board Member of Journal of Thermal Stresses, Taylor & Francis
8. Guest Editor, ACTA MECHANICA, for a Special Issue on Mechanics of Functional Materials and Structures
9. Editorial Board Member for Proceedings of the Indian National Science Academy (2017-2018)
10. Humboldt Senior Research Fellow, TU Darmstadt, Germany
11. Fulbright Senior Research Fellow, Stanford University
12. Recipient of Prof. N.S. Govinda Rao Medal for the best M.E. Student in Civil Engg. Dept. in Indian Institute of Science, Bangalore
13. Recipient of University Medal for First Rank in Civil Engg. Dept. in Jadavpur University
14. Recipient of Swapan Chandra Memorial Medal for Highest Marks in Design of Structures in Jadavpur University
15. Secured 99.96 percentile in Graduate Aptitude Test Examination (GATE-1989) in India
16. Secured 11th Rank in the State of West Bengal in Higher Secondary Exam. (Among ~ 3 lakh students) – Felicitated by Govt. of West Bengal



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