Leathers for Niche Segment

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Leather Process Tech Division

- Playing pivotal role in the development of Tanning Industry in the country by providing trained manpower and development and supply of appropriate technologies
- Instrumental in developing cleaner processing options including chrome management measures and recycling schemes for in-process control of pollution and for achieving zero waste water discharge
- Spearheading efforts in the transformation of leather making from chemical intensive processing to bioprocessing

Proven Technologies Available from Tannery Division

- Salt Free and Low Salt Preservation
- Cleaner Pretanning operations
- Cleaner Tanning Options
- Process modifications to improve productivity
- Value Engineering Research For Leather

DEVELOPMENT OF LEATHER FOR CHILDREN FOOTWEAR

Children Footwear

- Children's footwear - one of the fastest growing segments and holds share of nearly 11%
- Globally it is expected to grow at a CAGR of 3.7% owing to high demand of comfortable and designer footwear for children
- Shoes need to be made from breathable materials, such as leather
- Leather - In addition to being more durable, they will help to keep the child's foot cooler and dryer, helping to prevent blisters, and discomfort
- Uncomfortable footwear- restricts the free movements, changing of walking pattern

Requirements

- Children's feet sweat more than adults, so doctors recommend natural, breathable materials like leather
- Leathers with improved softness, comfort and durability
- Improper shoes can restrict child's healthy foot development
- Leathers to be REACH compliant and devoid of toxic substances
- Leathers to be skin friendly

Strategies adopted

- Cleaner pretanning – employing enzymes for avoiding toxic chemicals like sulphide
- Less chrome or chrome free tanning systems
- Modified post tanning process in order to achieve improved softness without affecting the requirements of upper leather
- Post tanning chemicals devoid of restricted substances like formaldehyde, heavy metals, APE's, Chlorinated phenols, etc.

Chemical	Reach Compliance level (mg/kg)
Azo dyes	<10
Chromium VI	<3
Formaldehyde	<20
Pentachlorophenol	<0.1
Antimony	5
Arsenic	0.2
Cadmium	0.1
Cobalt	4
Copper	50
Lead	0.8
Mercury	0.02
Nickel	4
Volatile organic compounds	<500
Nonyl phenol & nonyl phenol ethoxylates	Nil

REACH COMPLIANCE

Chemical	Compliance level for children shoes (mg/kg)
pH of water soluble	3.5 to 7.5
Formaldehyde	ND
Soluble mineral tanning agent	<50
Rest. Azo dyes	ND
Cr(VI)	ND

Optimization of tanning system

- Chrome tanning – Control trial
- Aldehyde tanning – Experiment 1
- Organic Tanning – Experiment 2
- Aluminium silicate – Experiment 3

Shrinkage Temperature and pH of Water soluble for control and experimental leathers		
Tanning type	Shrinkage temperature (°C)	pH of water extract
Full chrome	110 ± 2	4.51
Aldehyde Tannage	83 ± 2	4.74
Organic tannage	80 ± 2	4.44
Aluminium silicate	85 ± 3	4.41

PHYSICAL PROPERTIES				
Property	**Full chrome**	**Aldehyde tanning**	**Organic tanning**	**Aluminium silicate**
Tensile strength (N/mm^2)	20.15	21.17	20.415	23.63
Elongation at break (%)	58.72	43.50	47.5	52.92
Tear strength (N/mm)	55.08	55.72	50.23	51.16
Grain crack load (kg)	33.33	45.66	49.00	40
Distension (mm)	8.14	8.5	8.97	8.03
Colour fastness (grey scale value)	4	4	4	4
Light fastness (grey scale value)	4	4	4	4
Softness	6.03	4.39	3.91	5.31

Organoleptic properties of the control and experimental leathers					
Samples	**Fullness**	**Roundness**	**Smoothness**	**Softness**	**Tightness**
Full chrome	8	7	8	9	**6**
Aldehyde tanning	8	7	7	6	**7**
Organic tanning	8	7	7	6	**7**
Aluminium silicate tanning	**8**	**8**	**7**	**8**	**7**

Optimization of post tanning

Physical properties of the experimental leathers using various post tanning processes			
Property	**Trial 1**	**Trial 2**	**Trial 3**
Tensile strength (N/mm^2)	23.63	23.63	22.08
Elongation at break (%)	52.92	42.42	42.17
Tear strength (N/mm)	51.16	61.26	52.59
Grain crack load (kg)	40	36.66	46.66
Distension (mm)	8.03	9.89	12.56
Softness	5.31	5.01	5.23

Fabrication of Shoes

- Aluminium silicate tanned leather with the optimized post tanning process was used for the fabrication of children shoes

Exotic Leathers
"Exploring the Unexplored"

Exotic Leathers

- Exotic leathers represent a very small proportion of the total world production of leather
- Leathers made from exotic skins have very good market value because of their unique texture, beauty, durability and extraordinary properties
- Skins such as ostrich, emu, alligator, crocodile, fish, snake and lizards have become popular as a material for making leather

Exploring the Unexplored Raw Materials

- Sting ray fish Skin
- Chicken Legs
- Emu bird Skin
- Emu Bird Legs



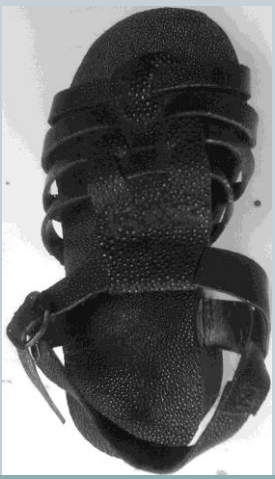
Converting Stingray Skin into Leather

- Stingray fish belongs to cartilaginous family
- The skin is composed of several types of cartilage surrounded by a fibrous perichondrium
- Stingray fish skins have denticles instead of scales
- Calcified denticles, made by the calcification of Type II collagen, is the stiff material present in the skin of stingray
- Dark brown coloration is invariably found on the entire dorsal portion of the skin
- It is a form of pigmentation and it is not the natural colour, which is removed by applying suplhide paste

Applications of Stingray Leather







An investigation on chicken leg skin for the preparation of leather

- Around 200 million square feet of chicken leg skin is available in India per year
- Chicken legs are not utilized properly due to lack of technology and awareness among tanners and poultry producers
- CLRI has taken an R&D initiative to investigate the feasibility of turning Chicken Leg Skins to leather products
- Advantages:
  - Unique Grain Pattern
  - Reptile like Structure
  - Readily available in large numbers
  - Wealth from waste
- Technology developed for the conversion of chicken leg skins into finished leather
- Leather products from chicken leg leathers will have better market value

Development of Processes for the Tanning and Finishing of Emu Skins

- Emu's are flightless birds, native to Australia
- Emu birds were brought to India during 1996 and commercial farming started during the year 2000
- Large quantities of emu skins are available but inadequate knowledge about emu skins amongst tanners results in wastage of skins
- Skins coming out from the emu farms are not effectively utilized and are wasted
- Tanning and finishing processes for emu skins have been developed
- Improved properties of the emu leathers enables the conversion in to leather products

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