

ACRONYM		CHEMPEN	
TITLE NOVEL APPROACHES TO OPTIMISING CHEMICAL PENETRATION DURING LEATHER MANUFACTURE			
Project Nº:		CRAF-1999-71481	
R+D Program / Type:		Competitive and Sustainable Growth	
Starting Date: 1st AUGUST 2002		Final Date: 31th JULY 2004	Duration: 24 MONTHS
Prime Proposer: BLC Leathersellers Research Centre Ltd		Coordinator: International Leathers (NI) Ltd	
RTD's Performers: AIICA (S), BLC Leathersellers Research Centre Ltd (UK), University of Pisa (I)		Other Partners: Industries Pere de Carme SA (S), Tarnsjo Gaveri AB (Sw), Geneiss Ecotec srl (I), Grad leather Specialities (UK), Compañía Catalano Europea de Curtidos sl (S)	
OBJECTIVES:			
<p>The qualities of leather and its performance are dependent to a large degree on achieving uniform reaction within the substance of the substrate and thus controlling penetration and reactivity of reagents is at the heart of making saleable products.</p> <p>The main objective of the project is to develop an understanding of the factors affecting chemical penetration through the cross-section of the skin/hide and into the hierarchy of the skin's structure during the leathermaking process.</p> <p>Improved penetration will obviate the need for excessive chemical offers and so lead to lower costs and lower levels of pollutants from the process, as well as improved leather quality and fewer rejects/reworks.</p>			
DESCRIPTION of the WORK:			
<p>Within this project there are SMEs operating in three sectors – leather manufacture, tannery equipment manufacture and chemical production. Each of these sectors will have activities for potential exploitation arising from this project.</p> <p>The main SME tasks are:</p> <ul style="list-style-type: none"> - Benchmark conventional processing systems. - Collaborate with RTD performers in development of novel products and processes. - Critically evaluate the research findings of the RTD performers. - Transfer laboratory scale developments into industrial scale performance. - Active participation in exploitation programme. <p>The main RTD tasks are:</p> <ul style="list-style-type: none"> - Develop a theoretical model for predicting penetration properties of processing chemicals related to process parameters, based on diffusion profiles, particle size, chemical structure properties, etc. - Develop analytical techniques for monitoring penetration of chemicals through and into the hierarchy of the leather structure. - Correlate theoretical modelling studies with laboratory scale trials. - Optimise conditions for a number of processes in laboratory scale trials. - Scale up of optimised processes to pilot plant and tannery scale operations. 			



Although the project will involve extensive scientific investigation the resulting model for chemical penetration will greatly simplify the optimisation process in leather manufacturing.

Due to the large quantity of parameters to be assessed, the work of this project have been structured in the following eight workpackages:

WP1. Benchmarking current penetration efficiencies at key process stages.

This first workpackage is designed to determine the costs and performance of conventional processes within the consortium tanneries. So, to examine the degree of penetration under existing commercial processing conditions and the extent to which tanners apply excess chemicals in attempts to achieve penetration.

WP2. Determination of reaction rates.

To measure the rate of reaction, and to determine time to approach equilibrium, a key element of chemical processing in leather manufacture.

WP3. Reagent concentration.

To measure diffusion profiles of the various processing chemicals, to predict penetration characteristics and to complete laboratory scale trials, monitoring the effects of the various processing parameters and auxiliaries on penetration.

WP4. Determination of penetration rates.

To optimise the balance between fixation and diffusion rate.

WP5. Solute-solvent effects.

To determine how the role of solvent-solute interactions relate to the rate of penetration of leather processing chemicals.

To asses the influence of subcutaneous sebaceous grease in achieving penetration of dyestuff.

WP6. Substrate reactivity.

To measure the effects of beamhouse processing and tanning on iso electric point.

To determine charge-pH relationships by using the affinity for charged species.

WP7. Scale up in the tannery.

To take the process technologies identified in earlier workpackages and scale up within the participating tanneries to industrial scale trials, for assessment of the impact of those technologies within the leather making process.

WP8. Exploitation.

To ensure that the information derived from the project is exploited to the benefit of the European leather sector.