



Perceptions of chrome and chrome-free tanning systems

Silvateam, Italy

This paper presents the findings from a survey to assess:

- The strengths and weaknesses of different types of tanning systems
- The understanding and use of various types of tannages
- The current interest in chrome-free tanning systems
- If chrome-free tanning will become well-established in the near future
- The future of chrome tanning systems

The findings are based on the opinions of a considerable range of tanneries producing chrome tanned, chrome tanned and chrome-free, and vegetable tanned leathers.

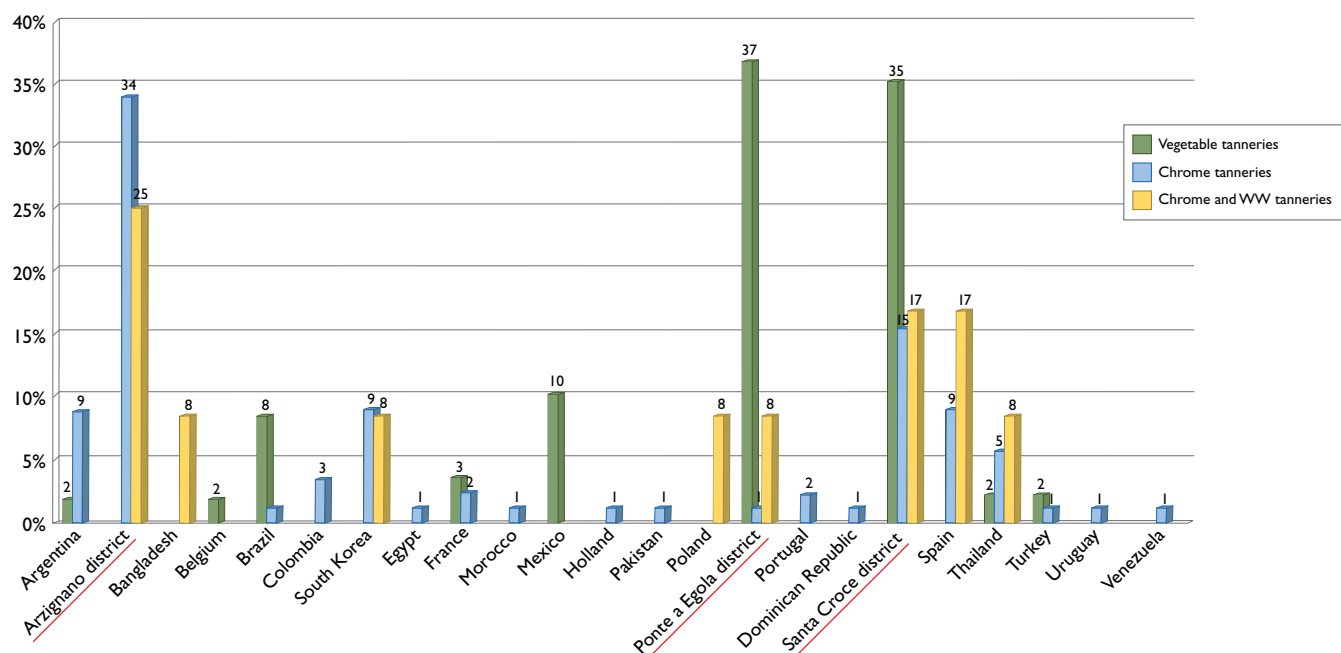
Leather chemicals manufacturer Silvateam recently completed a survey aimed at evaluating perceptions of tanners around the world of the strengths and weaknesses of different types of tannage. The survey coincided with the development of a new range of solutions for sustainable leather, called Ecotan, which Silvateam says allow the use of natural products that have less impact on the environment and are substitutes for hazardous chemicals.

Prior to the survey, a special mailing was carried out to raise

awareness among tanners and encourage them to participate. This was then followed by computer-assisted telephone interview (C.A.T.I.) where the interviewer follows a carefully constructed sequence of questions that are verified by the participating company.

In all, 163 tanneries were interviewed comprising 91 chrome, 60 vegetable, and 12 chrome and chrome-free manufacturers. Of the tanneries, 90% have knowledge of chrome-free tanning systems, and 58% are in operation in Italy. The spread of the locations is given as *Panel 1*:

Panel 1: Location of tanneries participating in the survey



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As vegetable tanneries tend to be small-size family business, especially in Italy, the information was obtained by direct contact with the owner of the company. For the chrome, and the chrome and chrome-free tanneries, the contact was with the appropriate technical manager. The findings from the survey are set down in *Panels 2, 3, 4, and 5*, and show:

Panel 2: The strengths and weaknesses of chrome tanned leathers as considered by the manufacturers of both chrome and chrome + chrome-free leathers:

Strengths: Chrome tanning is the most widespread method of tanning, leathers can be soft and supple and relatively easy and fast to process.

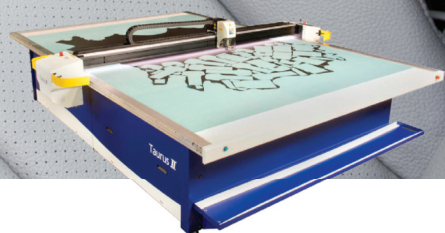
Weaknesses: The downside of chrome tanning is related to environmental sustainability, and leathers are sometimes viewed as highly standardised with a lack of naturalness, character and warmth.

Panel 3: The strengths and weaknesses of vegetable tanned leathers as perceived by both the manufacturers of both vegetable and chrome tanned leathers.

Strengths: Chrome tanners perceived vegetable tanned leathers to be more environmentally friendly and to produce leathers that are of a higher quality and value compared to other types of leather. Tanners who produce both vegetable tanned and chrome tanned leathers view vegetable tanned leathers as requiring



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Panel 2: Chrome tanning: strengths and weaknesses

Values as perceived by:

• Manufacturers of chrome tanned leather (Cr)

• Manufacturers of chrome tanned and chrome-free leathers (Cr + Cr/f)

Strengths expressed as %			Weaknesses expressed as %		
Characteristics	Cr	Cr+Cr/f	Characteristics	Cr	Cr+Cr/f
Soft and supple	22	30	Poor environmental profile	64	67
Quick and easy to produce	18	33	Lack of craftsmanship	9	13
Cheapest and most widespread	14	4	Not a very natural appearance	6	7
Suitable for specific articles	10	-	Greener coloured crust	5	-
Stable colour on aging	9	7	Low wearability	5	0
High thermal resistance	8	11	Chemical smell	4	0
Best type of tanning	5	4	Lack of charm and warmth	3	7
Versatility	5	4			
High heat and light fastness	2	4			
Water resistant	2	-			
Long shelf life of articles	2	4			
High physical performance	2	-			
Other	1	-	Other	-	2

Note: Values may total greater or less than 100% due to rounding of figures to nearest values.

skilled craftsmen to work on them, but say the leather acquires more beauty over time.

Weaknesses: For both chrome and vegetable tanneries, vegetable tanned leather is seen to crack due to direct heat, requires longer processing time, is easily stained in the presence of iron, has higher production costs, and a more limited colour range.

Panel 4: The strengths and weaknesses of chrome-free leathers compared to chrome tanned leathers as perceived by the manufacturers of all three types of leather:

Strengths: For manufacturers of all three types of leather (especially chrome leather manufacturers), chrome-free tanning is viewed as environmentally friendly compared to chrome due to the avoidance of chrome VI-related issues. Also for the ability to produce pastel colours.

Chrome tanners see that shrinkage temperature at a minimum of 70°C is no great advantage and manufacturers of vegetable tanned leather certainly do not view it as a disadvantage to them.

Manufacturers of chrome-free leathers see greater softness and good lightfastness when compared to vegetable tannages of greater significance than either chrome or vegetable tanners.

For manufacturers of vegetable tanned leathers, when chrome-free processes are used for pre-tanning, chemical use and costs in tanning and retanning are reduced. A higher degree of performance is perceived, as well as a higher level of softness. In addition, longer storage times before tanning are seen as valuable and as offering a cost-saving.

Panel 3: Vegetable tanning: strengths and weaknesses

Values as perceived by:

• Manufacturers of vegetable tanned leathers (Veg)

• Manufacturers of chrome tanned leather (Cr)

Strengths expressed as %			Weaknesses expressed as %		
Characteristics	Veg	Cr	Characteristics	Veg	Cr
Environmentally friendly	26	30	Higher prices/craftsmanship	22	14
Age old skills/craftsmanship	19	18	Heat can cause shrinkage/cracking	21	22
More value/higher average price	19	11	Longer process time	18	20
Unique and inimitable	14	24	Iron stains	18	13
Natural colours and warm tones	12	9	Limited colours	13	15
Suitable for specific articles	8	4	Low versatility	2	7
Pleasing touch	-	2	Low heat and light fastness	2	6
Good thickness and fullness	1	-	Low resistance to physical tests	1	2
Other	-	2	Other	4	2

Note: Values may total greater or less than 100% due to rounding of figures to nearest values.

(NOTE: this is a contradiction to observations concerning storage times for chrome-free leathers in general and cited as a weakness in the following category).

Weaknesses: For manufacturers of all three types of leather, chrome-free tanning incurs higher cost and requires more controls compared to other tannages. Storage times (predyeing/retanning) are shorter for wet white than for wet blue. Chrome-free manufacturers view lower shrinkage temperatures, lower physical properties and other (unspecified) issues of significance.

The future of chrome-free and chrome tanning systems as perceived by the manufacturers of chrome and chrome-free, chrome tanned, and vegetable tanned leathers is given in Panel 5.

Findings from the investigation

Based on the current opinions of the tanners participating in this study, the future of chrome and chrome-free is perceived as follows:

- There is a high value in the development of chrome-free tanning systems due to environmental chrome-related issues.
- Processes based on synthetic tannins is considered to be the most probable approach for chrome-free tanning in the future.
- The development of other chrome-free systems are viewed as significant.
- Chrome-free leathers show a higher value in terms of quality, price and respect for the environment than chrome leathers.
- The substantial role of vegetable tannage will continue. 🌱



Panel 4: Chrome-free tanning: strengths and weaknesses

Values as perceived by:

• Manufacturers of chrome tanned and chrome-free leathers (Cr + Cr/f)

• Manufacturers of chrome tanned leather (Cr)

• Manufacturers of vegetable tanned leathers (Veg)

Strengths expressed as %				Weaknesses expressed as %			
Characteristics	Cr+ Cr/f	Cr	Veg	Characteristics	Cr+ Cr/f	Cr	Veg
No Cr(VI) formation	32	35	12	Greater cost compared to Cr tannage	35	43	50
Pastel colours	20	19	13	Lower resistance to shrinkage temp compared to Cr tannage	14	4	-
Greater softness compared to veg tannage	20	4	10	Lower resistance to physical tests compared to Cr tannage	14	4	-
Good lightfastness compared to veg tannage	12	7	3	More control necessary compared to Cr tannage	7	15	25
Better performance compared to veg tannage	8	1	13	Low heat and light fastness compared to Cr tannage	7	5	4
More natural handle compared to Cr tannage	4	13	10	Little demand in market compared to Cr tannage	7	7	-
Pleasing touch compared to Cr tannage	0	4	2	Shorter storage time (pre dye/retan) for wet white than wet blue	-	7	7
Shrinkage temp at least 70°C	-	11	1	Low fullness compared to vegetable tannage	-	3	-
Greater beauty over time compared to chrome tannage	-	2	2				
Longer storage time before tanning compared to vegetable tannage	-	-	17				
Lower chemical use in tanning/retanning compared to veg tannage	-	-	14				
Other	4	4	3	Other	16	12	14

Note: Values may total greater or less than 100% due to rounding of figures to nearest values.

Panel 5: The future of chrome-free and chrome tanning systems

Values as perceived by:

• Manufacturers of chrome tanned and chrome-free leathers (Cr + Cr/f)

• Manufacturers of chrome tanned leather (Cr)

• Manufacturers of vegetable tanned leathers (Veg)

Future tanning systems			
Characteristics	Cr+	Cr	Veg
Chrome-free tanning using synthetic tannins, such as phenols and disulfone	42	44	33
Chrome tanning will continue	17	21	7
Chrome-free using glutaraldehyde	17	15	5
Chrome-free tanning using metals (Zirconium, aluminium etc.)	17	9	2
Chrome-free based on vegetable tanning agents	8	11	40
No opinion	-	-	7
Other	-	-	7

Note: Values may total greater or less than 100% due to rounding of figures to nearest values.

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