The problem of softening of paints

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Softening of paints has turned out to be a real enigma. Those who are directly involved, being them formulators, manufacturers of wood coatings or purchasers, know that I am not exaggerating when I speak of a problem that has persisted and recurred for decades.
The effects of hand creams on coated wood surfaces have been studied for decades, too. Sometimes with satisfactory results, sometimes less, so if not really discouraging results. Certainly, for technicians and standardizers like us, it is a real problem, especially for reproducibility...But what if the problem does not derive from hand creams? What if this long-standing belief is a blunder?
Read this article and you will be surprised at the latest implications...

Well, it is not a blunder, or rather not entirely.
Over the last few months, I have been particularly dedicated to carrying out tests to assess the softening of coating systems by hand creams, with the aim of finding a **repeatable and reproducible** method suitable to differentiate the performance of the paints to this effect**.**

The difficulties are several: first and foremost, the test material. Hand creams do not have the same formulation all and, although a certain brand can be found and chosen on the market for this purpose, over time, it will inevitably undergo any changes; secondly, finding a less subjective as possible method to quantify the loss of coating hardness; last but not least, **certain coatings not only soften, but also lose so much adhesion** that a complete restoring of the painted object might be necessary**.**
It is this last problem that made me change my perspective. In fact, numerous tests have shown that all paints soften to some level because of hand creams if these are particularly 'aggressive', certainly some coatings more than others.
Various tests were carried out to verify this; the one that seemed least subjective and, in any case, simple and not too costly was the **pendulum damping one.**
Both the Persoz and König methods were very helpful in providing data.
Applying the cream for 24 hours, after removal and not simple cleaning of the surface, the **results** appeared to be stimulating because it is indeed possible to obtain numerical data, thus solving the problem of subjectivity of evaluation
So, creams do make coatings soften, but only some of them lose adhesion.

Perzos pendulum

Scratching tool

How can this effect be assessed?

We find help from a **method of testing the adhesion** of coatings to the substrate after a stress, which is derived from Ikea's requirements and is intended to simulate what many people do with their fingernail or a coin.
This tool allows for some differentiation, but coatings known to be very sensitive to creams have not always shown obvious adhesion problems.

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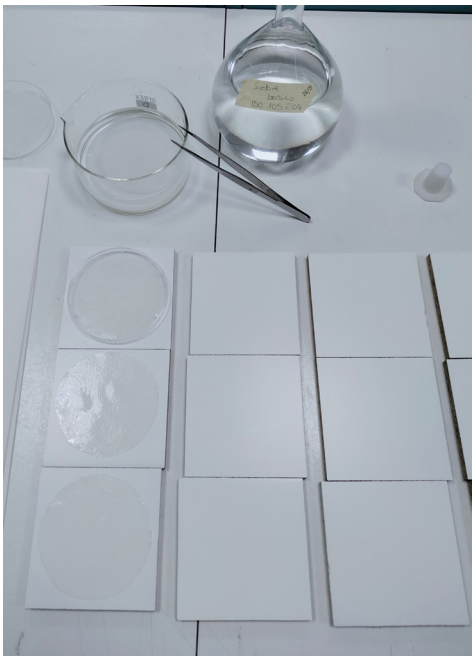

Synthetic sweat application

What if cream is not the problem?

When testing for resistance to cold liquids, one often notices that as soon as the test product is removed, it has caused softening.
Well, the substance that aroused my curiosity the most was the **'synthetic perspiration'**, both basic and acidic, but the basic on certain test samples gave the same visual effect as the hand cream had given in the immediate removal; the acid also too aggressive, I would have considered.

Well, the results are very satisfactory.

As can be seen in the table, the data obtained **with the pendulum test** show that a **softening of all coatings** due to both the effect of hand cream and synthetic perspiration substance occurred.
Testing the adhesion **using the scratch method**, **the performance** of the different paints **can be differentiated** with the synthetic perspiration substance, only.

	Hardness loss with pendulum Persoz (%)		Adhesion with scratch method	
Sample	with hand cream	with synthetic perspiration	with hand cream	with synthetic perspiration
1	-42,4	-51,1	Heavy dimple. No removal.	Evident removal. Visible to the naked eye.
2	-30,6	-45,0	Minor removal. Only with 10x lens.	Evident removal. Visible to the naked eye.
3	-29,6	-38,6	Partial removal.	Slight removal. Only with 10x lens
4	-36,6	-52,2	Evident removal. Visible to the naked eye.	Evident removal. Visible to the naked eye.
5	-36,9	-39,8	Evident removal. Visible to the naked eye.	Evident removal. Visible to the naked eye.
6	-24,7	-41,9	No removal. Slight dimple.	No removal. Slight dimple.
7	-19,4	-44,7	No removal. Slight dimple.	No removal. Slight dimple.

Legend:
coatings 1 to 5: one component water-borne
coatings 6 and 7: two-component water-borne
coating 3: one component water-borne with softening resistant formulation

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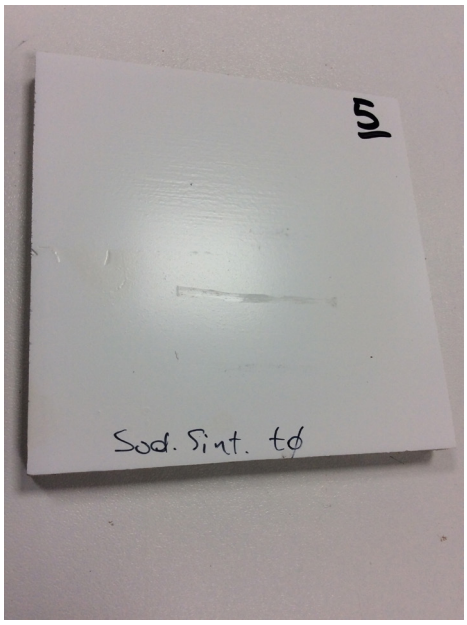
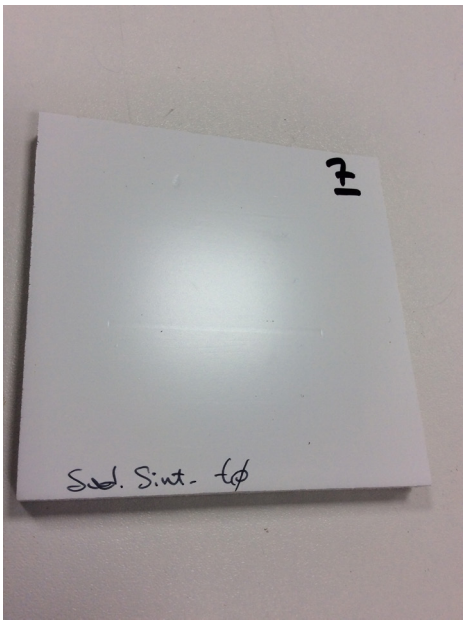
Below are photographs of two representative samples:



Sample 5
scratch method with synthetic perspiration:
evident removal
visible to the naked eye



Sample 7
scratch method with synthetic perspiration:
no removal
slight dimple

The objectives:

1. Uniformity of the method
2. Use of standardized test material
3. Standardized and objective test method

What about the cream, then? Yes, the problem started with attributing the trouble to the use of creams, but even some oils also make coatings soft, acetone does it, water...
Now, whatever the cause of the specific case, **will we have achieved our goals?**

In standardization we will discuss this very soon, but perhaps we are on the right track.

I would like to thank Sirca and their technicians for their presence and technical contribution, the supply of painted panels in the solutions useful to reach conclusions.

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