

Squaring the Circle: Vegetable Sheetfed Offset Inks for Food Packaging

BY Dr. Gilles Catherin
SIEGWERK

Sheetfed inks for Food and Tobacco Packaging in the 1990s; odour is the main issue.

Sheetfed offset has always been a popular process for food packaging in carton containers because of the excellent qualities and performances achieved on such substrate.

This is true also in the tobacco segment where, even if marginal in volume, sheetfed printing is appreciated for its low cost/high quality ratio, in particular for short runs.

Naturally, as soon as 1990, under consumers' pressure and brand owners demands, specific formulations have been developed for these two particular segments.

However, the focus at the time was only on odour of the

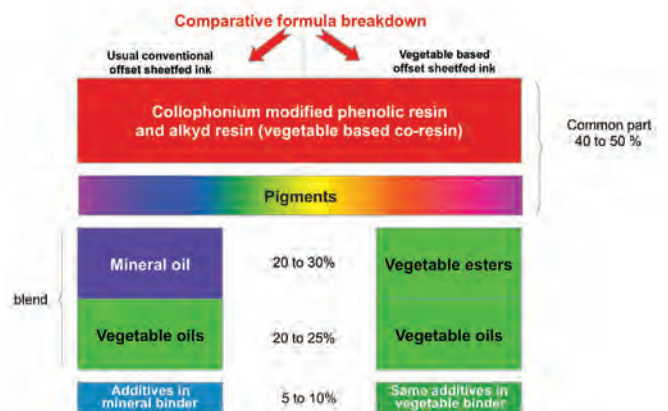
package itself and, eventually of the cigarettes or food products in the packages.

In this relatively "low demanding" context, the technical solution to reduce odour without compromising too much on press performances was pretty straight forward, consisting mostly in changing the "solvent" part of the inks from linseed oil/aromatic mineral oils to aromatic-free (paraffinic) oils and keeping only the soya alkyd instead of a combination linseed/soya.

Around 1995, it has been discovered, in particular at Siegwerk, that replacing the mineral oils partly or totally by vegetable esters was resulting in significantly better ink balance properties of the inks and, hence, much better press performances, as needed with the new generation of faster sheetfed presses.

	Plain mineral oil based	Low odour inks – 90's
Resin	Phenolic modified rosin ester	
Co-resin	Linseed/soya alkyd	Soya alkyd
Solvent	Linseed oil Aromatic mineral oil	Aromatic-free Mineral oil (paraffinic)
Dryers	Co, Mn salts	Co, Mn salts
Additives	Hydroquinone	Hydroquinone

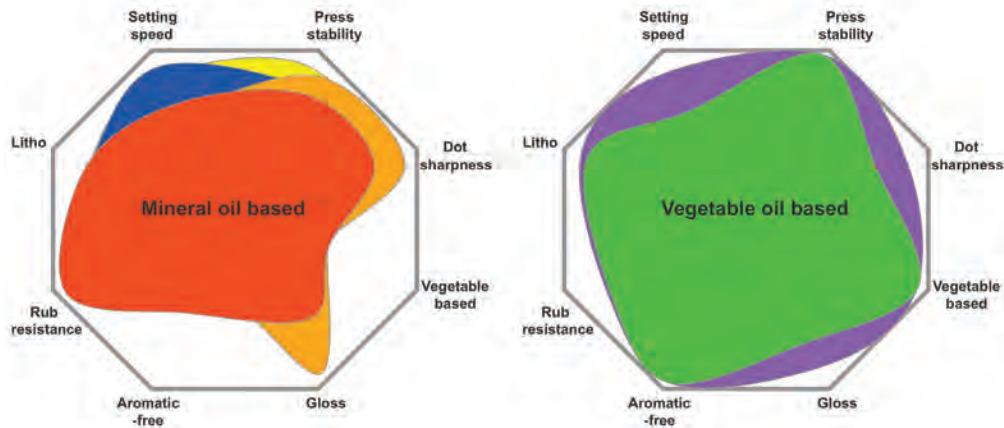
Picture 1: In parallel, as of the 1995s, vegetable sheetfed offset inks were starting to have a growing popularity.



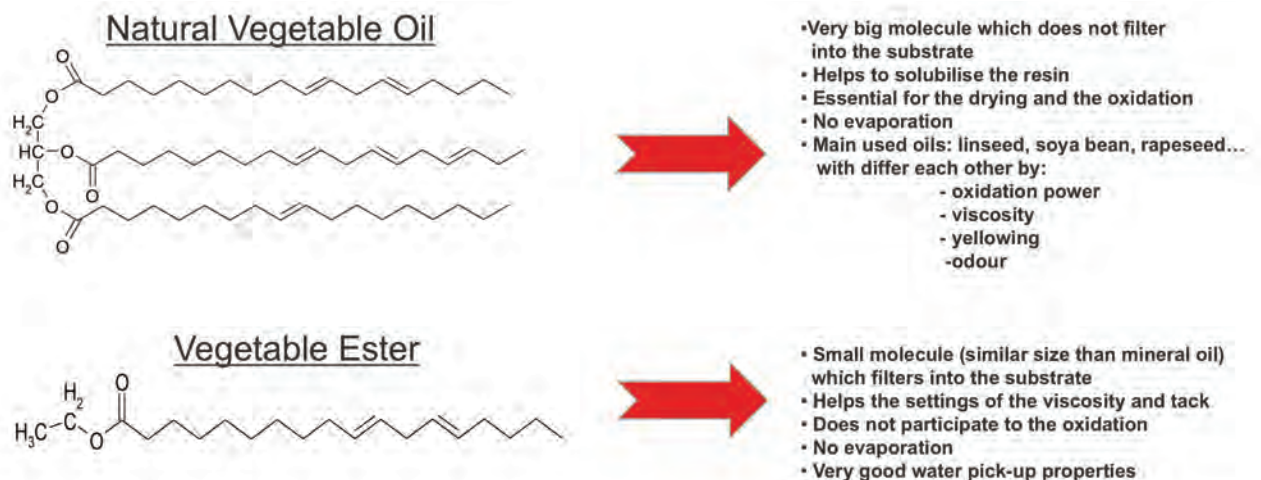
Picture 2

As a matter of fact, after only few more years of developments, the main ink companies have been able to offer vegetable inks outperforming mineral inks not only for press performances, but also for gloss, pigment wetting without

The occidental offset technology is traditionally based on complementary different ink profiles



Picture 6



Picture 7: The new Tempo Nutripack does indeed show excellent press performances.

formulation raw materials to present no risk to health whatever the possible level of migration into the food.

Indeed, after quite extensive research effort, they did come up with a unique solution, using food grade vegetable fatty acid ester and suppressing both the metallic salts used so far as dryers and the stabilizers/ anti-skinning additives: A totally new generation of inks, Tempo Nutripack, was born.

As expected, the press performances of the new Nutripack, thanks to extremely good litho behaving (water/ink balance), is largely superior to those of all previous inks, be the conventional mineral oil-based inks or the Tempo Foodpack series.

But, even more importantly, the new Nutripack formulation concept does fully meet low odour requests. The Robinson test is the most reliable way to evaluate risk of odour of a given packaging and/or the product inside.

Several such tests run by major food companies have all been demonstrating Tempo Nutripack to be systematically at a maximum of value 1, meaning “no odour detectable.”

Hence, the challenge of “squaring the circle” had been overcome with success with a formulation not only offering better overall performance than any other technology but, also, a significant lower level of odour.

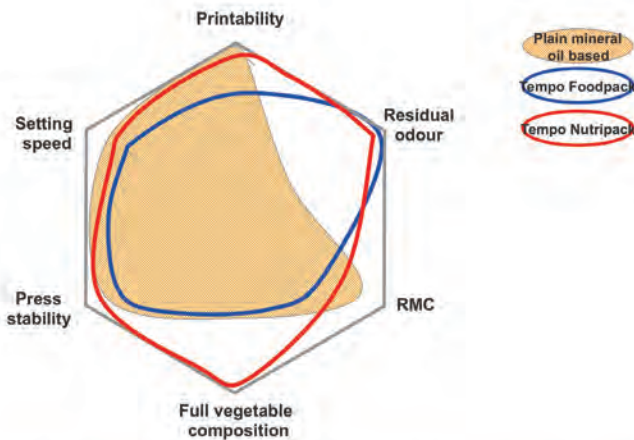
But, furthermore, Tempo Nutripack is the perfect answer to product compliance and migration risk.

Because of the very particular choice of vegetable oil and of the fatty esters used in the formulation of Nutripack, all the migration tests are also extremely positive and superior to any other technologies on the market.

- Regarding the oil, the specific migration limit (SML) being as high as 30 mg/kg, the risk is zero even against worst case scenario.

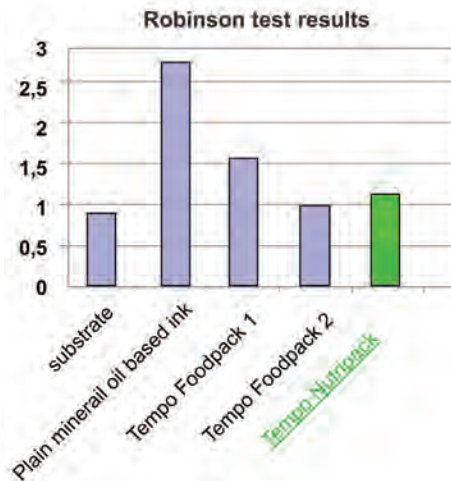
- On top, there is no residual solvent such as hexane having been identified.

- Regarding the fatty esters, having no SML thanks to specific grade, a migration as measured at a maximum of 500 ppb (including board) demonstrates perfect safety and compliance.



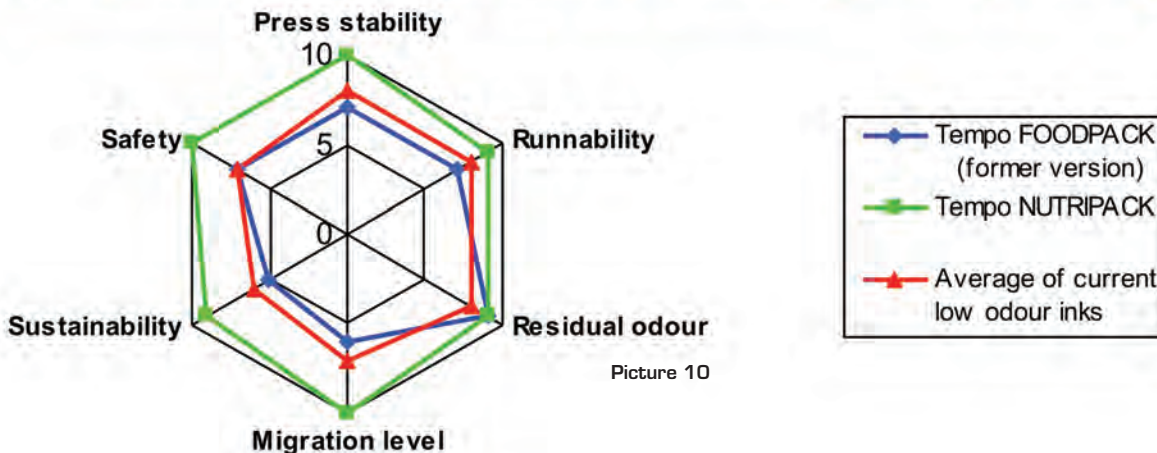
With the new vegetable and low odour series, Siegwerk guarantees a very low residual odour level whilst keeping a printability as good as a plain mineral oil based ink

Picture 8



Picture 9

Tempo Nutripack meets food regulations whilst maintaining excellent printability



Picture 10

• Decomposition oxidative products having a SML of 2000 ppb each, having been found at 150 ppm only, are no issue either.

This set of performances does confirm Nutripack being a significant step ahead of any other technologies, both for press performances and product compliance, against any other low odour products.

As the “cherry on the cake,” Nutripack is also one step further towards sustainability. Tempo Nutripack has been developed with the aim of using as much renewable raw materials as possible, as to move towards a better “sustainability” profile:

- Besides pigments, most of the raw materials used are from renewable sources
- All materials are GMO-free.
- No metallic salts or cobalt derivatives are being used.
- No antioxidant, nor additive from the hydroquinone family is used.
- No VOC present.

Once again, Siegwerk’s approach is “Ink’ Heart and Soul”!

Indeed, only Siegwerk’s knowledge of ink technology, and also of its application on press, could have led to the concept of formulating a “low odour vegetable offset inks” against all odds.

But also, Heart has been needed to convince partners that this was a viable solution worth assessing.

And Soul to have the will not only to comply with regulations but to also start addressing sustainability aspiration.

Dr. Gilles Catherin, engineer in chemistry and PhD in macromolecular chemistry obtained in 1979, is a real “Inky.” His career in printing inks started in 1982 with Sicpa. Within this group, he has been successively technical director in France, operational director in Asia-Pacific region, and general director for South East Asia. With Sicpa first and with Siegwerk as of 2005, he has organized the research activities and became vice president of innovation. His innovative ideas have made him the co-inventor of more than 12 patents covering different ink technologies as well as manufacturing processes. Since 2010, he works as a consultant to transfer his recognized expertise and knowledge. ■