



(Courtesy of McAirLaid's Vliesstoffe GmbH)

McAirLaid's factory in Steinfurt, Germany

Chasing the CAT Out: Alternative Cigarette Filter Materials

(Courtesy of McAirLaid's Vliesstoffe GmbH)



Katja Selle, associate sales director, McAirLaid's

Cellulose acetate tow (CAT) has been around for decades despite its notoriously bad biodegradability properties. But environmentally friendly filter materials are forcefully pushing onto the scene and just might give CAT a serious run for its money in the near future.

Thomas Schmid

Cellulose acetate tow – or CAT - is today the most commonly used raw material for manufacturing cigarette filter plugs. Or rather, it's always been, maintaining a quasi-monopoly status. That status may be justified, though. After all, CAT imparts exceptional filtering and retention properties. But, it also decomposes notoriously slowly. Additionally, during the making of filter rods the individual fibers need to be bonded together with a synthetic glue or resin, most commonly triacetate, and that doesn't really help improve biodegradability either.

Global Problems with CAT Litter

The littering of CAT filters is of course a problem that contributes to environmental pollution. Each year up to 120 billion butts are carelessly thrown away on streets and sidewalks or end up in gutters, forests, parks, lakes and rivers, in the oceans, on beaches, and where not. According to an audit conducted by the San Francisco city council some years ago, cleaning up this mess costs the municipality (and thus the tax payer) more than US\$7 million annually. And, despite being produced from cellulose fibers, the material has been chemically altered to form a polymer that stubbornly resists natural decomposition. Various studies over the decades have established that CAT filters can take anywhere from two to ten years to biodegrade. Bacteria and other microorganisms simply find it too hard to digest.

Real Alternatives Have Been Elusive

Cigarette companies have of course always scouted for alternative filter materials as replacements for CAT, but with little success. There just appears to be nothing that can match all the tried and tested advantages that CAT offers, including taste neutrality, low thermo-conductivity, high heat resistance, ease of processing and, last but not least, cost efficiency. So, CAT is here to stay for the foreseeable future. Or is it? There are in fact a number of materials that could play a significant role in eventually delegating CAT to the annals of history – if their respective inventors or suppliers play it right.

Airlying: A Step in the Right Direction, But...

German company McAirLaid's Vliesstoffe GmbH is a major supplier of a broad range of tows, non-woven fabrics and other fibrous materials used in a vast variety of applications. One particular manufacturing technique the company deploys is known as "airlying," which by the way is of course wittily reflected in its very name, McAirLaid's. "Pure cellulose fibers are laid down in a process that is analogous to paper making. But instead of using water to deposit the fibers, we use [pressured] air," explains associate sales director Katja Selle. However, after airlying the fibers normally still need to be treated with certain glues to ensure bonding and cohesion... and out the window flies much-touted environmental friendliness.

Doing Away with Glues and Resins

But in the late 1990s, McAirLaid's invented a patented process that allowed the airlaid cellulose fibers to bond without such glues or resins. This resulted in a highly pure yet durable material that could be used in the rather picky food, hygiene and medical industries, for example to make meat pads, wound dressings and female hygiene products, just to name a few. Since the product almost exclusively consists of untreated, unadulterated, entirely natural cellulose fibers, it also biodegrades very quickly. "We are talking weeks rather than years," asserts Selle. What's more, it also is odorless, taste-neutral and heat resistant. Perfect for a cigarette filter, right?



Joseph Tang, sales director, Tianjin Glory Tang Fiber Technology Co. Ltd.

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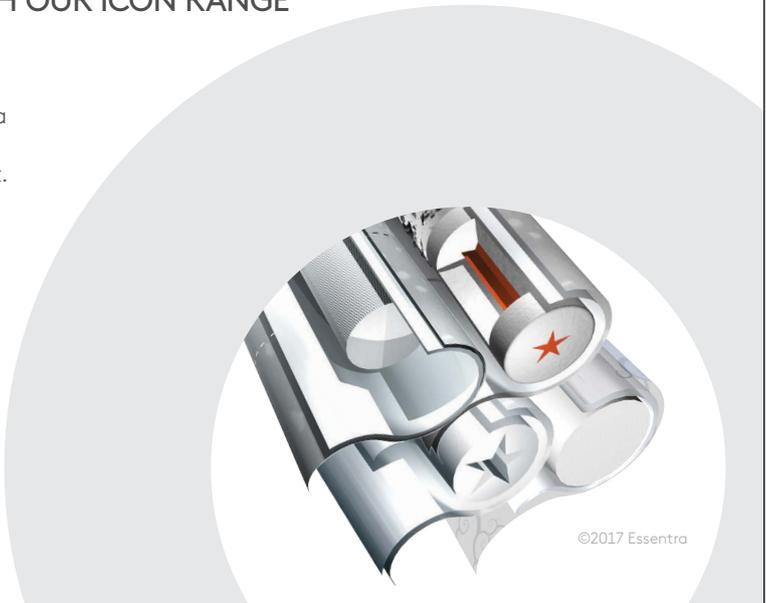
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PLA tow and filter rods manufactured from it

Keeping a Low Profile until the Time is Right

And that is exactly what McAirLaid thought, too. Following extensive further research and development, the company about one year ago finally derived a commercially viable version of its patented material that can indeed be used as a CAT substitute, according to McAirLaid's sales director, Peter Gawley. Until most recently the company preferred to stay under the radar with its product, though, "simply because it wasn't ready for a large-scale public launch." "Optimizing it for the cigarette filter business has only taken place over the last couple of years and we didn't really concentrate on branding and extensive marketing," Gawley explains.

GENIALity on the Immediate Horizon

But that is going to change as McAirLaid intends to introduce its product officially as soon as trademarking procedures have concluded. "We are almost ready to launch the dedicated branding of our biodegradable filter, which will be called 'Genia'. It's a word derived from Greek and means 'generation,'" confides Selle. "We see 'Genia' as the next generation filter and will market it as such." Gawley adds that "conventional airlaid cellulose has already been in use for many years in cigarette filters in Japan, but keep in mind that they are always treated with synthetic glues as the bonding agent. We realized that airlaid cellulose with no glues or binders could have a wider application across the industry because of the increasing emphasis on the environment."

Tests Confirm Exceptional Filtering Properties

Selle reiterates that unlike CAT, the material will fully biodegrade and turn into compost in a matter of weeks, which the company has already certified several years ago in lab tests. "And while other alternatives like paper filters, for example, are also biodegradable, 'Genia' creates no objectionable taste during smoking, which makes it unique."

Furthermore, the pressure drop can be easily adjusted and – when measured at the same pressure drop point – Genia has shown to be more efficient than CAT at removing tar and nicotine, as well as being selective to phenols, findings that likewise were confirmed during the aforementioned tests. "And as we speak we are conducting yet another round of lab studies, but this time for biodegradability of 'Genia' when in an actual filter format," adds Selle. "To be frank, we don't expect any different results than from the initial

study on the material. The current testing round will only reconfirm 'Genia's' superiority over conventional CAT even more clearly".

High Time for a Change

Gawley, meanwhile, is adamant that the industry needs a little shake-up, as it has become too static and, well, "CAT-centric". "The filter material industry has not really changed in the past 50 years, so this is a great opportunity [for them] to replace existing products with something more sustainable," he says. With interested parties apparently already on board (Gawley: "It's still under confidentiality wraps."), commercial cigarettes exclusively using the Genia filter are scheduled to make their debut in the European market by mid-2018 and towards the end of the year also in parts of Asia.

PLA: Similar to CAT? Not Quite.

Another alternative filter material that has made some headlines in the trade press is polylactic acid (PLA). A polymer not all too dissimilar from cellulose acetate, it is produced through fermentation and subsequent esterification of vegetable starch (normally from maize or sugar beets). First synthesized in the 1930s, it has primarily been used for producing thin laminate films, varnishes or, more recently, biodegradable plastic bags, plant pots and similar items. But it's only been a few years since the idea of using PLA tow for cigarette filters first emerged, with a handful of Chinese companies currently being the principal suppliers. One of them is Tianjin Glory Tang Fiber Technology Co. Ltd., a name that for obvious reasons we shall shorten to Glory Tang in this article.

Dealing in all sorts of industrial fibers, Glory Tang started manufacturing PLA tow in 2009. "Our motivation for offering the material to filter manufacturers was its proven 100-percent biodegradability and thus eco friendliness," says sales director Joseph Tang. "But we also saw export potential because the demand for acetate tow quite frequently exceeds supply." The company generally uses corn as the raw material to synthesize PLA in its own factory, but Tang prefers to keep the exact process a secret.

Quick and Complete Decomposition – But at a Price

While PLA indeed very easily and quickly decomposes in pretty much any environmental condition within a few short weeks, its usage for cigarette filters has not really materialized on a large scale. Even Tang admits that his company in 2017 exported less than five tons (5,000 kgs) of filter-grade PLA tow. The calculation is simple: An average filter plug weighs approximately 0.4 grams. Considering that some loss occurs during manu-