

GROWING SEGMENT

Carbon filters are the fastest-growing segment of the filter market.

By Brandy Brinson

Charcoal filters are the fastest growing filter types on the market. Charcoal (the common term for activated carbon) is popular for its taste characteristics, but is also increasingly being used because of its ability to reduce harmful compounds in cigarette smoke. To this day, charcoal is the most effective filter additive at reducing the highest number of harmful compounds from Hoffmann's List (also see "Best Defense," *Tobacco Reporter*, October 2000). As the development of potential reduced exposure products (PREPs) continues, the use of charcoal is likely to accelerate even more.

"The interest in what activated carbon can achieve in cigarette filters has increased tremendously throughout the entire industry as 'reduced risk' tobacco product R&D continues. Volume has probably doubled in the last five years and is on the way to have a sharp increase with more specific carbons," says Philippe Montagnon, senior vice president for Asia and Europe for Pacco, a leading supplier of activated carbon to the cigarette industry.

Since its first use in cigarette filters 50 years ago, charcoal is bigger than ever. "Carbon has been used in cigarette filters from the 1950s in various products; most notably in Japan, which was the first market to use carbon filters in a major way. It is believed carbon was originally used in Japan to improve the taste of cigarettes produced with locally grown tobacco. Since this humble beginning, the use of carbon in filters has grown phenomenally and currently it is the fastest growing segment of the filter market," says Mike Taylor, Scientific Services Manager of Filtrona.

MAJOR MARKETS. While Japan has long been the market known for its high volume of charcoal filters, other markets are flocking to carbon as well.

Tim Probert, Marketing Director of Filtrona, says, "Many countries throughout the world now use carbon filters. The major markets for carbon filters are Japan, South Korea, Hungary, Russia and Venezuela. However, other long term markets exist for carbon filters in countries such as Switzerland, Poland, Taiwan, Colombia, Italy and Greece. Furthermore, new markets are emerging, having been influenced by some of these core markets. Venezuela is influencing Chile, Brazil and Argentina; Russia is influencing Ukraine and Romania; Korea and Japan are influencing other Asian countries."

Among all these markets, eastern Europe has seen the most growth by far—particularly Russia. "The ex-Soviet Union and surrounding countries have now launched many cigarettes with carbon filters. These countries opening to the western world with their brands made it easier to launch carbon filters directly as compared with Europe having to switch from non-carbon to carbon filters. So, it is not the richest countries that are developing as fast as the other ones," says Montagnon.

Probert, says, "Although there is significant growth in the use of carbon filters in many markets, nowhere is this more evident than in Russia where the use of carbon filtered cigarettes has increased from 1.3 percent of the market in 1997 to 8.5 percent in 2002."

HOW MUCH GROWTH? It's difficult to obtain accurate statistics on the global growth of charcoal filters. As Probert says, "Global market data is very hard to obtain, but a Filtrona survey conducted in May 2003 identified 339 brand variants with carbon cigarette filters in 59 countries and the number of launches clearly continues to rise strongly. This market growth has been very rapid in the emerging markets."

WHY CHARCOAL? Charcoal has achieved popularity because of taste preferences as well as its ability to reduce risk and meet regulations. "I believe it is both and sometimes fashion in certain countries, but to a lesser extent," says Montagnon.

Brian Tucker, of Brown & Williamson, says, "It is currently more of a taste preference than either PREP or regulation related. Some smokers seem to prefer them. Charcoal is a readily available technology to reduce various compounds in smoke, however, and will probably play a significant role in the development of PREPs."

According to Filtrona, the increase in popularity of carbon filters, "suggests that in markets where carbon is used, carbon seems to be perceived by the smoker as adding to the smoking experience. Carbon in cigarette filters has generally been used for taste reasons and is normally considered to produce smoother, cooler smoke. Carbon has applications in many areas because of its filtration capability and has long been perceived to have purifying and cleansing properties."

Charcoal has a strong record of reliability as a cigarette filter component. "The acceptance of carbon within the cigarette industry is probably due to the fact that it is well known, has been used over many years and has gained acceptance as the best granular adsorbent currently commercially available for the reduction of compounds from cigarette smoke. Other granular additives used in the past, such as silica gel, have much lower overall reduction efficiencies than carbon. A great deal of research is currently ongoing into selective filtration of harmful compounds from cigarette smoke. In some cases significant progress is being made but it will still be some years, if at all, before carbon is surpassed as the major granular additive in cigarette filters. Many of these selective additives will tend to be used in multiple filters in combination with carbon helping to maintain carbon's role as the major granular additive in cigarette filters for many years to come," says Taylor.

Paul Jadot, of the newly developed company Mebttec, says, "There certainly are materials that are more effective than carbon, but those may be expensive and difficult to introduce into filters with conventional dual or cavity technology. Carbon is a natural material that is likely not a hazard. It is abundant, relatively cheap, and very effective."

ABILITY TO REDUCE. Despite the attempts to create other filter additives to reduce selected smoke compounds, charcoal remains the most effective.

According to Taylor, carbon is highly effective at removing significant quantities of many of the volatile compounds found in smoke (e.g. hydrogen cyanide, formaldehyde, acrolein, isoprene and benzene). Some of the semi-volatile compounds (e.g. quinoline, pyridine and some phenols) are also removed by carbon.

He adds, "Of course, the permanent gases (e.g. carbon monoxide and nitric oxide) are currently unaffected by any filtration medium other than through the use of ventilation. The non-volatile materials (e.g. aromatic amines, tobacco specific nitrosamines and benzo[a]pyrene) will be removed by mechanical retention and their reduction will be similar to the overall tar retention."

Jadot adds, “Several cigarette companies are testing carbons with a modified surface area in an attempt to selectively remove condensable gases.”

TASTE. One of the hurdles to introducing carbon in markets that have traditionally used non-carbon filters is taste. Tucker explains, “Charcoal adsorption of vapor phase compounds from mainstream smoke causes a change in the smoke equilibrium, and hence the cigarettes’ taste is different than non-charcoal filtered cigarettes.”

Jadot says, “Carbon is traditionally used as a taste modifier. In Japan, where most cigarettes are carbon-equipped, none of the products were sold as ‘low risk,’ although clearly Japanese brands’ smoke chemistry is different from non-carbon equipped cigarettes. The taste is modified because the carbon retains certain gases, therefore changing the smoke balance. In general, charcoal equipped cigarettes are milder in taste or ‘less harsh.’ In the States, this mildness is achieved by *adding* products to the tobacco and by blending the tobacco, while in Japan it is achieved by *removing* compounds from smoke.”

He continues, “Carbon’s taste modifier is due to its ability to retain selectively a large number of condensable gases, some of which are on the Hoffmann List. Due to the fact that charcoal filtered cigarette production is a mature process, because carbon is relatively cheap and abundant, and because a large body of scientific data is available, it is logical that cigarette producers went to using and testing carbon first. Other materials, such as resins are used (such as in Brown & Williamson’s Advance) and were used in the past, because of the ability to be selective towards gas removal, differently than carbon. These materials are expensive.”

The impact of carbon on taste can be adjusted, says Taylor. “The taste of carbon can be modified by the amount of carbon used, as well as the design of the carbon filter. It is not an insurmountable issue. The main resistance to the major use of carbon is possibly the impact of taste especially in traditional monoacetate markets. Although the carbon taste is suitable for certain markets and/or tobacco blends, there may be lower levels of acceptance throughout the non-carbon markets. In time, tobacco blends may change to readdress the taste of carbon-filtered cigarettes, this may encourage current non-carbon markets to take advantage of the compound reduction benefits of carbon filters. Also future requirements for lower yield of possible harmful materials either by consumer preference or by legislation may see a gradual introduction of carbon filters perhaps starting at lower carbon levels and slowly increasing.”

U.S. MARKET. The U.S. market has not been quick to adopt charcoal filters, mainly because of taste preferences. Tucker says, “I don’t think this is changing at present, but it may in the future—with the advent of PREP cigarettes. Americans may simply prefer the taste of cigarettes without charcoal, similar to the preference for either menthol or non-menthol cigarettes.”

Jadot says, “I believe that the taste can be overcome. Light cigarettes were not accepted for taste reasons as did filtered cigarettes, but both categories eventually were created.”

All the major U.S. cigarette manufacturers are conducting R&D on carbon for reduced risk products. “Few brands are using carbon filters, but the industry is closely looking at panel tests in selected states in the U.S. Regulation might force the increased

need for carbon—so long as the taste of the cigarette is not affected. Lots of R&D is being done on this,” says Montagnon.

There has been some small growth of carbon filters recently. Two new reduced-risk products on the market—Brown & Williamson’s Advance and Vector’s Omni—both have charcoal filters.

However, their growth has been limited. “Charcoal filtered cigarettes introduced as ‘low risk’ are performing only moderately at best,” says Jadot. “They are launched as a response to consumer demand for lower risk products. It may be that the consumer is confused about the message attached to some of those products in that he/she identifies light products with ‘lower risk’ products. The consumer is not informed about the debate surrounding the science of smoke.”

He adds that, “It took a long time for the ‘light market segment to develop in the States, as did the segment of filtered cigarettes. There is no segment for ‘lower risk’ products.”

FUTURE GROWTH? As for the future industry direction, Probert says it will be “partly consumer driven, partly legislation driven and partly health driven.”

“It is believed that the growth trend for the use of carbon and other additives will accelerate significantly in the future. Current trends suggest that Eastern Europe and Asia will see huge growth in the next few years,” says Probert.

Montagnon concurs, “Most of the growth will come from the eastern block region prior to Europe and the USA. Nevertheless, due to regulations and stricter specifications for cigarettes, carbon will be the alternative.”

Jadot believes that the major growth in charcoal will occur in three potential areas—the United States, Europe and China.

He says growth will occur in the U.S., only if and when a category of “lower-risk cigarettes” is successfully introduced. He says this will depend on whether or not the FDA is granted regulatory authority over cigarette manufacturing and if the agency creates a “lower risk product category.” If this occurs, “Philip Morris would find this compatible with its pursuit of lower-risk product development and its acceptance of FDA supervision. Some manufacturers—the largest—would be able to introduce products that would meet these still-to-be-designed criteria. The bar would be raised for smaller companies that would not be able to: 1) have the resources to submit these products to rigorous testing; 2) manufacture these products because they would likely require the use of more expensive equipment; 3) afford the compliance with FDA requirements; 4) afford internal quality control standards and systems.”

He adds that if a company successfully introduces a lower risk product prior to FDA supervision, it could coerce the FDA to recognize such a category. “This approach is more risky from a commercial point of view, but cheaper from a developmental point of view. Vector is a vanguard, as well as Brown & Williamson, both using carbon. The commercial success of these brands is, however, not assured.”

In Europe, he says, “Lower risk cigarettes are not such an active segment of the development efforts of European companies, but an eventual U.S. development could lead Europe. Europe is more concerned with tar and nicotine reduction due to EU regulation.”

The Chinese market may develop internally produced carbon equipped cigarettes to imitate the Japanese high-end brands. To do this, he says, China will need to install specialized equipment.

Whether expansion occurs faster in Europe, Asia or the U.S., it looks as if carbon is destined for more growth and a long, healthy future.