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March 2025

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THE GLOBAL FLAVOR INDUSTRY ENTERS A 'COMPLEX' AND 'RAPIDLY EVOLVING' PHASE, SAYS IOFI EXECUTIVE DIRECTOR

Sven Ballschmiede, executive director of the International Organization of the Flavor Industry, discusses regulation flashpoints, healthy food trend impacts and more.

Sniffing Out the Future: Airzai's Smart Tech is Disrupting the Fragrance Game

ICATS Adapts Learning Platform to Support Continued Aroma Trade Education: Q&A with Education Officer

Sipping on the Run: RTD Coffee and Tea Market Emphasizes Convenience, Health

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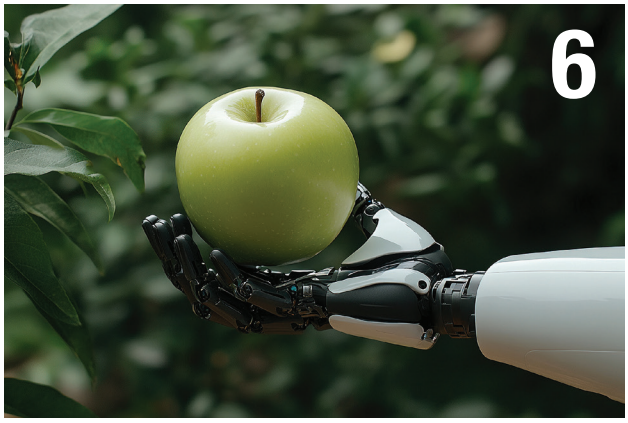
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Perfumer & Flavorist+ magazine
336 Gundersen Drive, Suite D
Carol Stream, IL 60188-2403 USA
fax: 1-630-653-2192 • e-mail: perfumer@allured.com

@perfumerflavorist Perfumer & Flavorist @perfumer_flavorist

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EDITORIAL
Content Director Jeb Gleason-Allured | 1-630-344-6069/jallured@allured.com
Editor in Chief Katie Anderson | 1-630-344-6077/kanderson@allured.com
Associate Managing Editor Emily Little | 1-630-344-6058/elittle@allured.com

SOCIAL MEDIA
Social Media Manager Emmanuel Henderson | 1-630-344-6020/ehenderson@allured.com

ADVERTISING SALES
Business Development Manager Jolly Patel | 1-630-344-6061/jpatel@allured.com
Advertising Production Manager Kasia Smialkowski | 1-630-344-6025/ksmialkowski@allured.com
Advertising Production & Business Intelligence Specialist Ethan Grisham | 1-630-344-6068/egrisham@allured.com

AUDIENCE DEVELOPMENT
Audience Development Manager Sam Attebery | 1-630-344-6027/sattebery@allured.com
Customer Service 1-847-559-7554/customerservice@perfumerflavorist.com

DESIGN
Assistant Design Manager James Fergus
Senior Graphic Designer Hon Bannapradist

CORPORATE
Partner & CEO George Fox
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Marketing & Creative Director Kim Fry
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Allured Business Media
1-630-653-2155 • fax 1-630-653-2192
336 Gundersen Drive, Suite D
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(9 AM-5 PM Central, Mon-Fri) | Fax: 1-847-291-4816
E-mail: customerservice@perfumerflavorist.com
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New Year, New Regulations



Elections in the United States and European Union have ushered in concerns for major regulatory changes.

I remember sitting in on a talk during a trade show a few years ago about a new non-neutrative sweetener, and the entire audience collectively groaned when the term "regulatory" came into the conversation. They didn't want to hear about the compliance of this sweetener; they just wanted to hear about how it performs in the product. That's what matters, right? But the speaker reminded the audience that the regulatory aspects of the product were just as important as its applications. No compliance, no innovative sweetener, no new product.

The flavor and fragrance industries are being affected by regulatory challenges and changing political landscapes. New leaders are elected and propose new policies, and the industry must quickly adjust to them. We've seen this in both the United States and the European Union within the past year. For example, in January the FDA revoked the use of red dye no. 3 as a color additive in food and drugs. So it's up to companies to think on their feet to come up with creative and innovative solutions when these policy changes are announced.

So while the term "regulatory" may elicit eye rolls and groans, it's extremely important in the industry and can directly impact product development. How can a company pivot if an ingredient they've used for decades in their product now isn't allowed in a certain country? And how can the industry advocate for itself to make sure these policies are informed by good science and not political lobbying?

These two industries have demonstrated their ability to think through supply chain issues and pandemic uncertainty, and I think the same creativity will apply to solving regulatory challenges. The key will be continuing to educate oneself on the issues at hand and the regulations coming down the pipeline. No one wants to be caught unprepared when the deadline comes to call.



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Associate Managing Editor
elittle@allured.com

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INDUSTRY INSIGHTS:

Industry Experts Discuss Artificial Intelligence Innovation and Role of Robotics in Flavor and Fragrance Industry

Learn more about how the industry is applying these technologies while keeping humans at the center of innovation.



Product developers in the flavor and fragrance industries are using artificial intelligence to reduce the development timeline.

Image by Atlas Studio at Adobe Stock

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Humans are always looking ahead to the next innovation, the next bit of technology that will help make lives easier, and that is certainly true in the flavor and fragrance industries. Automation technologies are being developed for various tasks considered mundane and time-consuming, and research is always evolving in this space.

Perfumer & Flavorist+ enlisted the help of Rich DiBernardo, CEO of iniTech Inc; Masoud Bahmai, managing director at Accurate Dosing Systems; Heli Kilpala, strategic marketing and innovation director at Biospringer by Lesaffre; and Antoine Thomas, flavor development manager at Biospringer by Lesaffre to share how they believe artificial intelligence and automation will influence the flavor and fragrance industries.

How do you see the role of artificial intelligence in the flavor and fragrance industry evolving over the next year?



Rich DiBernardo, CEO of iniTech Inc.

Rich DiBernardo [RD]: Over the next year, the biggest challenge for AI in F&F manufacturing won't be the AI itself—it will be ensuring that companies have the proper digital foundation in place. Investing in a strong digital backbone and integrating AI into manufacturing workflows will be the key to unlocking AI's full potential. Without this foundation, companies risk falling into the garbage-in, garbage-out trap, limiting AI's effectiveness and failing to maximize its value.



Masoud Bahmai, managing director at Accurate Dosing Systems

Masoud Bahmai [MB]: AI has the potential to significantly disrupt the flavor and fragrance market in the coming years. Robotic-dosing systems will assist the AI-driven software in creating and evaluating samples. This will require very fast dosing robots capable of producing thousands of small-scale samples daily, combined with AI software equipped with advanced sensors that can "sniff" and learn to refine formulations continuously.

Heli Kilpala and Antoine Thomas [HK, AT]: Artificial intelligence has been cited as a new solution to accelerate creation and enable the emergence of more competitive new products on the market for a few years now. In my opinion, there are two major points I would like to develop.



Heli Kilpala, strategic marketing and innovation director at Biospringer by Lesaffre



Antoine Thomas, flavor development manager at Biospringer by Lesaffre

First, the ability to generate data, because without data there is no AI. In our industry, this means collecting a large amount of data at every stage of a product: data on raw materials, processes, analytical compositions, sensory evaluations, and properties. All this data generation and collection is starting to be well implemented by the largest players in the industry (the larger the company, the more data it has, which can give a crucial advantage to big players).

And second, the ability to analyze this data and put it at the service of the business. Digital & Data teams have become strategic for these companies that want to be the pioneers of AI in the F&F industry, and it is these specialists and the strategy of putting them at the center of interactions with the business that will enable this emergence and acceleration in the market.

Many solutions are already being implemented internally, and are already helping to facilitate the work of certain teams (literature searches, quick analysis of large datasets to uncover trends, insights, or patterns, etc.). We see that AI is there to work next to humans, enhancing productivity, efficiency, and decision-making in daily work tasks across the industry.

How can robotics and automation help the flavor and fragrance industry while keeping that "human touch"?

[RD]: In flavor and fragrance manufacturing, automation has already replaced some of the repetitive, manual operations on the shop floor, improving efficiency, precision, and consistency. Before PLC-based automation (programmable logic controller), operators manually measured, weighed and dispensed all ingredients, leading to batch inconsistencies, human error and physical strain from handling heavy

L to R: courtesy of Rich DiBernardo; Masoud Mahmai; Biospringer by Lesaffre; Antoine Thomas

materials. PLCs now control ingredient dispensing systems, ensuring precision and eliminating some of the manual measuring. Instead of eliminating jobs, PLCs create a demand for technicians and programmers, to program and troubleshoot automated systems, and process analysts, to oversee decision-making and continuous improvement.

Now, as AI and humanoid robots are introduced, I believe that they will follow the same pattern as PLC-based automation—not replacing workers but supporting them in areas where hiring is increasingly difficult. As AI becomes more integrated with manual work processes and shop floor automation, humanoid robots will soon be providing "workers" to fill labor gaps where human workers are becoming harder to find.

Just as PLC-based automation created higher-skilled jobs, I believe that AI and humanoid robots will do the same—enhancing efficiency, reducing strain, and enabling innovation. The real challenge isn't job loss but upskilling workers for an AI-driven future while automation fills roles people no longer want.

[MB]: Robotics and AI cannot replace the human role in the industry. There are many factors involved in flavor and fragrance creation that I don't see being fully replicated by automation. Instead, I believe robotics and AI will serve as tools to assist perfumers, flavorists, and compounders by streamlining processes, improving efficiency, and enhancing precision – while still preserving the artistry and expertise that humans bring to the craft.

[HK, AT]: As is often the case when talking about AI, I think it needs to be seen as a tool to serve the creative teams, rather than as a replacement for humans tomorrow. The first ones mentioned are the formulators (perfumers and flavorists), who will retain that precious creative role that makes the difference for the client. On the other hand, AI tools will make it possible to accelerate and facilitate their work, for example by pre-selecting certain formulas or raw materials to test, providing tracks of reflection to explore, and above all by carrying out a large number of trials upstream of the human's work. This technology is a tool at the service of the human, who remains the master of the initial brief and the final validation of the product.

We see that in the future, AI will play a more and more prominent role also in direct customer interactions. Sales and customer service will benefit from AI systems like ChatGPT in terms of efficiency. For example, AI can be used to support automating follow-ups to customer needs, support with inquiries, and tailor marketing content based on customer preferences and behaviors. The new technologies will play a prominent role to support business growth where AI-enabled CRM systems can predict customer needs, propose actions, and that way help humans be more targeted and value-adding to customers. Again, AI is not there to replace humans, but to improve the quality of the human touch.



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Ingredients



Pennyroyal

Ernesto Ventós S.A.

https://www.ventos.com/es/producto/1051

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Phenethyl octanoate

Avant Organics

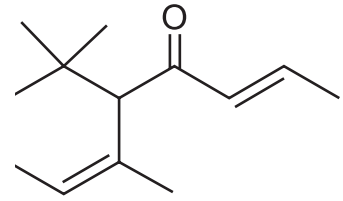
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Phenethyl Octanoate (FEMA #3222, CAS #5457-70-5) is a captivating flavor molecule that seamlessly blends floral elegance with rich, fruity depth. This ester exudes a luxurious, rose-like aroma intertwined with creamy, tropical undertones reminiscent of ripe pears and lush coconut. A subtle waxy smoothness enhances its profile, adding a velvety texture that enriches formulations in perfumery and flavor applications alike. Its well-rounded sweetness makes it a sought-after component in exotic fruit blends, where it contributes a soft, lingering richness that amplifies both floral and fatty nuances. Whether enhancing delicate berry notes or providing depth to creamy, indulgent creations, phenethyl octanoate is a unique and versatile ingredient that elevates sensory experiences with its sophisticated balance of floral and fruity opulence. Avant Organics provides this material as EU Natural, Kosher, non-GMO, and Halal.

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(E)-1-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-2-buten-1-one;1-(2,6,6-Trimethyl-2-cyclohexen-1-yl)-2-buten-1-one; Dorinone Alpha; Dihydro floriffone Alpha (FEMA 4088(E)/3659, CAS 24720-09-0(E)/43052-87-5). Diffusive fruity-floral with rose, apple, blackcurrant and mint notes, and can be applied in fine fragrance, personal care, fabric care, and home care.



Phenylethyl phenylacetate, natural

Penta International Corporation

https://www.pentamfg.com

Phenylethyl phenylacetate (CAS# 102-20-5, FEMA# 2866, JECFA# 999) contains a flavor profile of honey, floral, green, rose and cocoa. The odor type is floral, rosy, sweet, balsamic with green fatty nuances. Our material is Kosher and Halal Compliant.

Images courtesy of the manufacturers

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SOLVENTS IN FRAGRANCES: UNDERSTANDING CONSUMERS EXPECTATIONS AND MARKET TRENDS

Solvay's experts explain how solvents can be used to enhance fragrance formulations and meet consumer demands.

SPONSORED BY SOLVAY



Courtesy of Solvay

Fragrances have become an integral part of daily life, whether through the fresh scent of laundry products, the soothing scent of candles, or the clean and uplifting fragrance of air fresheners and cleaners. In the dynamic landscape of the fragrance industry, **solvents play an essential role in the formulation process**.

As consumer preferences evolve, environmental concerns gain more attention, and the dialogue around ingredient transparency intensifies, the fragrance market embraces new challenges and opportunities. The role of solvents in fragrance formulations is expanding beyond simple dilution to include factors like sustainability, safety, and performance enhancement. The need for low-odor, biodegradable, and high-performance solvents that comply with upcoming regulations is driving innovation in the industry.

The art of perfumery and fragrance creation extends beyond captivating scents; it involves a complex interplay of chemical compounds in which **solvents serve several key roles**, such as solubilizing fragrances, stabilizing formulas, ensuring a uniform texture and appearance, controlling evaporation rates, enabling a consistent scent release over time and a long-lasting performance of air fresheners and scented products, and warranting sustainable claims for the final products.

The air care industry is shifting toward consumer preferences, environmental concerns, and regulatory demands. Recent studies reveal that nearly 70% of consumers actively check labels for potential allergens and harmful substances. Consequently, there is a growing demand for natural, organic, and sustainable ingredients, including alternative solvents derived from plant sources. Nowadays, consumers are interested in the fragrance profile and the **integrity of the ingredients** that create them.

The regulatory framework surrounding the use of solvents is continually evolving. Stricter regulations from organizations like the European Union REACH and the United States EPA impose guidelines that impact solvent selection in formulations. Governments are tightening regulations around using VOCs, particularly in consumer products that contribute to indoor air quality, pushing companies to innovate with alternative solvents that meet **safety and performance standards**. Additionally, safety assessments and **consumer advocacy for non-toxic ingredients** are reshaping the conversation around solvent use.

Innovation in solvent technology, especially the development of bio-based and green solvents, is paving the way for more sustainable formulation practices. These advancements address consumer concerns regarding health and safety and support brands seeking to enhance their **sustainability initiatives**.



As trends in the fragrance market continue to shift toward sustainability, safety, and performance, manufacturers are increasingly turning to more eco- friendly and innovative solutions. While often overlooked, **solvents are decisive elements that directly impact product safety, sensory experiences, and brand perception.** Thus, brands can thrive in a competitive market by aligning product development with consumer preferences for transparency and sustainability.

Considering all these challenges and focusing on bringing solutions aligned with customer needs, Solvay presents Augeo ® Clean Multi - a low-odor, non-toxic, bio-based, readily biodegradable LVP-VOC solvent. Augeo ® Clean Multi meets all the safety and sustainability requirements with a low carbon footprint of 1.6 kgCO2e/kg net footprint (2.6 kgCO2e/kg as GWP and 1.0 kgCO2e/kg as biogenic content). Augeo ® Clean Multi acts as a great fragrance carrier and solubilizer, delivering high performance and competitiveness to replace traditional petrochemical-based solvents.

The Estée Lauder Companies Announces Location for New Fragrance Atelier in Paris



The Fragrance Atelier will be the home of the company's new "La Maison des Parfums," a dedicated center serving Estée Lauder's fragrance brands.

On December 19, 2024, The Estée Lauder Companies announced the location of a new innovation hub in the heart of Paris at 14-18 Rue Volney. The new atelier is expected to open in 2025.

The Fragrance Atelier will be the home of the company's new "La Maison des Parfums," a dedicated center serving Estée Lauder's fragrance brands. Further, the site will serve as a co-creation space for fragrance houses, ingredient suppliers, and other stakeholders in the fragrance industry.

"We are thrilled to receive the keys to our new space in the heart of paris, which will serve as our 'Maison des Parfums' and include our new Fragrance Atelier," said Stéphane de La Faverie, executive group president at the Estée Lauder Companies. "This exciting new center of fragrance excellence offers proximity to our existing corporate enterprise office network as well as our fragrance partners, enabling accelerated innovation and speed to our market."

Sumit Bhasin, senior vice president of global fragrance innovation, product development and R&D, added, "The Atelier will further strengthen our end-to-end fragrance innovation by complementing ELC's broader value chain footprint and capabilities in Europe and worldwide. We are eager to deepen our collaborations across the innovation ecosystem in Paris and drive greater speed and agility."

p&f+

Image by Vitaliy at Adobe Stock

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IFF Announces Changes to Board of Directors

On December 19, 2024, flavor and fragrance maker IFF announced key changes to its Board of Directors. These changes are aimed at bolstering the company's strategic vision and driving market growth.

Kevin O'Byrne will become Board Chair at the 2025 shareholder meeting. An experienced board member of IFF, O'Byrne will succeed Roger W. Ferguson, Jr. who has served as chair since 2022.

"It has been an incredible honor and privilege to serve on the IFF board," Ferguson said. "IFF has the right leaders in place, a dynamic team fueled by science and creativity, plus a world-class portfolio backed by a cutting-edge R&D pipeline. The company is very well placed to meet the needs of its customers, powering everyday products for tomorrow's consumers. I am very proud of the strong progress in the last twelve months and excited to see IFF build on this momentum in the coming years."

Additionally, Cynthia Jamison, Mehmood Khan and Vincent Intrieri will join the Board of Directors on January 1, 2025.

Erik Fyrwald, CEO and director of IFF, said, "As we author our next chapter, I look forward to working with Kevin in his new role. I am delighted to welcome Cindie, Mehmood and Vince to the board. Their expertise, experience and insights will support us in unlocking our full potential to serve our customers, deliver innovative, sustainable solutions and profitably grow IFF."



These changes are aimed at bolstering the company's strategic vision and driving market growth.

VEXA Beauty Launches Peptide-Infused Fragrance Line

Personal care brand VEXA Beauty announced the launch of its first fragrance line infused with oxytocin peptides.

Oxytocin is a hormone that promotes positive feelings. It has earned the nickname "love hormone" for its role in childbirth and interactions between partners.

The fragrance line was developed to combine aphrodisiacs and mood-enhancing notes. The brand's founder said the team carefully selected scents that have been linked to feelings of happiness and sensuality in previous studies.

"Every fragrance is an artistic expression designed to deliver a complete sensory experience," said founder Sabah Karimi. "The oxytocin peptides enhance the unique sensory nature of each fragrance and work with your body chemistry, creating something truly distinctive in the world of perfumery."

VEXA Beauty also launched its VEXA Fusion butter, a body butter that acts as a fragrance primer to extend the wear of each scent.

Fragrance Highlights

Velvet Rush: Pomelo, Turkish rose, amber, vanilla



The four fragrances are infused with oxytocin peptides, the hormone associated with feelings of love and sensuality.

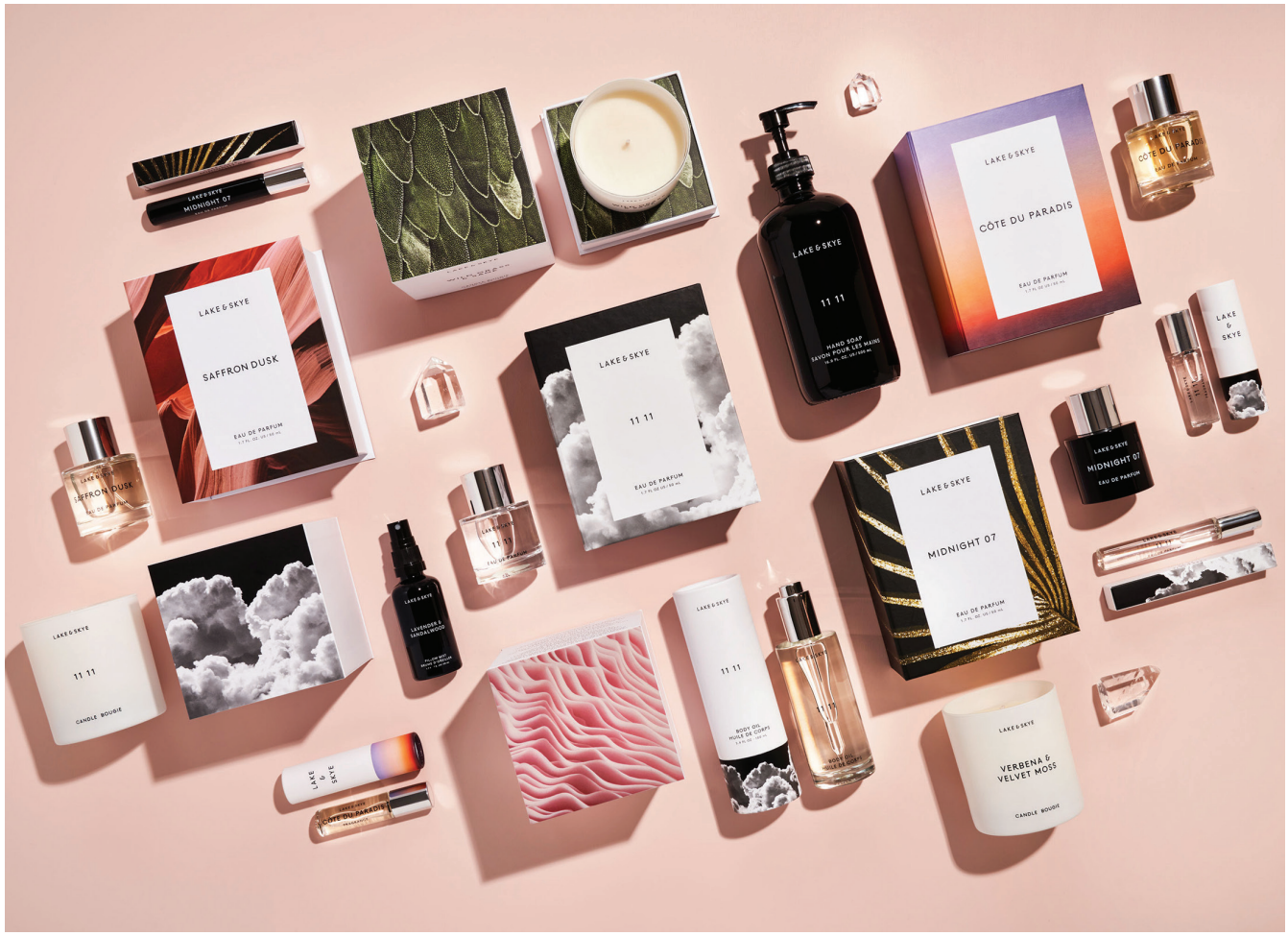
Siren No.9: Raspberry, neroli, vanilla orchid, sandalwood

Stiletto Nights: Crushed raspberry seed, wild honeysuckle, jasmine, caramelized praline

Fatale: Bergamot, Turkish rose, jasmine sambar, musk

From top: Image by Pixel Matrix at Adobe Stock; Courtesy of VEXA Beauty

Tru Fragrance Acquires Lake & Skye



Founded in 1969, Tru Fragrance & Beauty assists brands and retail partners in the beauty space from design and product development to financial modeling and global sourcing. The company's partners include Ulta Beauty, Urban Outfitters, TJ Maxx, and Nordstrom.

On January 8, 2025, fragrance and wellness brand Lake & Skye announced that it had been acquired by Tru Fragrance.

Founded in 1969, Tru Fragrance & Beauty assists brands and retail partners in the beauty space from design and product development to financial modeling and global sourcing. The company's partners include Ulta Beauty, Urban Outfitters, TJ Maxx, and Nordstrom.

Tru Fragrance & Beauty first made a minority investment in Lake & Skye in 2018. Company officials hope that this acquisition will help continue Lake & Skye's growth and portfolio expansion.

Courtney Somer, chief executive officer and founder of Lake & Skye, said, "This acquisition marks an inflection point for our brand. Tru Fragrance has played a pivotal role in Lake & Skye's growth since 2018, and I'm excited to deepen our collaboration and continue our upward trajectory. By working closely together, we're poised to elevate the brand to new heights, deepening our relationship with the fragrance and wellness community that has so warmly embraced us."

Eric Bilenko, chief executive officer of Tru Fragrance & Beauty, added, "Founded on Courtney's vision of creating iconic clean fragrances, Lake & Skye is recognized whin the fragrance community for this commitment since the launch of 11 11. The brand's unique ability to connect wellbeing with scent resonates deeply with today's consumers and aligns perfectly with Tru's mission to nurture brands with purpose and longevity."

Courtesy of Lake & Skye

Vitaquest Announces Lychee as 2025 Supplement Flavor of the Year

Contract manufacturing organization Vitaquest International announced lychee as the 2025 supplement flavor of the year.

Lychee is a small, round fruit with a red shell and sweet, juicy flesh. It is known for its floral taste similar to rosewater and strawberries. Lychee is gaining popularity in many products, from hydration and energy to functional beverages.

"Lychee has become a commercial success, particularly in hydration products, and we're seeing a lot more experimentation with this versatile flavor," said Vitaquest's chief executive officer Patrick Brueggman. "Its distinctive floral notes really set it apart from more common fruit flavors, giving consumers a new and refreshing aromatic experience that resonates well with current trends."

"The nutraceutical industry often follows trends in the food and beverage sector, and lychee is no exception," said Kevin Kumetz, senior formulator at Vitaquest. "It pairs perfectly with hydration, greens, and even energy products, making it a versatile choice for manufacturers."

Kumetz also explained that floral flavors, such as hibiscus and lavender, have been increasing in popularity over the past year, and lychee is a natural progression of that trend.



According to consumer research company Datassential, the number of lychee items on US menus grew by 24% between 2020 and 2024.

According to consumer research company Datassential, the number of lychee items on US menus grew by 24% between 2020 and 2024. The flavor is most frequently featured in beverages, but can also be found paired with desserts and proteins.

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Eurofragance Appoints Three Master Perfumers



This milestone represents a key step in consolidating its expertise in fragrance creation in a competitive global market.

On January 14, 2025, fragrance house Eurofragance appointed its first three master perfumers: Belén Garcia, Isabel Gil Trujillo and Olaf Larsen.

"Recognizing Belén, Isabel, and Olof as Master Perfumers is our way of expressing gratitude for their passion and dedication, which contribute so much to the company and the world of fragrances," said Rebeca Jardón, chief people officer at Eurofragance. "Furthermore, this recognition is not only a source of pride for Eurofragance but also a testament to our commitment to recognizing the talent of our teams and the development of our professionals globally."

Master Perfumers

Belén Garcia, Barcelona

Specialization: Fine Fragrance

Belén Garcia's career at Eurofragance spans over 30 years. She believes that the process of creating a perfume comes from within, from the heart. Her creations evoke emotions and create moments of reflection. For her, each fragrance is an invitation to better understand oneself and connect with one's inner voice.

"Becoming a Master Perfumer is an honor and an opportunity to further explore the creation of fragrances that connect with people on an emotional level," she said. "This title reinforces my commitment to the art of perfumery and the impact it can have on those who experience it."

Isabel Gil Trujillo, Barcelona

Specialization: Home Care, Personal Care, Air Care

Isabel Gil started as a Perfumer Assistant at Eurofragance 24 years ago. During this time, she spent four years working in the company's Singapore affiliate. Over her tenure, she has built a solid experience in creating scents for the home care, personal care and air care categories. After her experience in Asia, she returned to Barcelona with a renewed vision that she applies to each of her creations.

"Achieving the title of Master Perfumer means taking my passion and experience to new heights. I am excited to continue creating fragrances that enhance people's everyday lives and bring them moments of joy," she said.

Olaf Larson, Dubai

Specialization: Fine Fragrances

Fascinated by the fragrance cultures of the Middle East and Asia, Olaf has been living in Dubai for twelve years. His creation palette includes notes such as ambergris, a perfumery raw material that embodies the olfactive richness of the Gulf region. For him, a fragrance should not only smell good, but make you feel good.

Olaf Larsen said, "Being recognized as a Master Perfumer is a dream come true. This achievement represents my passion for perfumery, as well as my commitment to continue exploring and honoring the olfactive richness of each culture."

Courtesy of Eurofragance

Solina Acquires Advanced Food Systems

On January 15, 2025, global ingredient company Solina announced its acquisition of Advanced Food Systems, a supplier of custom dry seasoning solutions for food manufacturers.

Advanced Food Systems, located in New Jersey, provides customized ingredient systems for a variety of applications, including meat and poultry products, frozen foods, sauces and marinades. Under the signed agreement, 40 employees from Advanced Food Systems will join Solina USA.

This is Solina's third acquisition in the United States and first in the northeast. Company officials hope this will help Solina broaden and strengthen its presence in the region.

"This acquisition represents a significant step forward in our ability to deliver great value to our customers, said Solina USA president Michael Marks. "Advanced Food Systems' strengths in product functionality, such as improving performance, efficiency, and yields, perfectly complement Solina USA's expertise in flavor. Together, we will offer a comprehensive range of high-quality, cost-effective functional and flavor solutions that address our customers' needs more effectively than ever before."

Solina's chief executive officer Anthony Francheterre added, "With Advanced Food Systems, Solina has acquired a company with a complementary business, industrial strategy, and operational practices. Like Solina USA, Advanced Food Systems combines market and consumer insights with culinary expertise, R&D infrastructure, and innovation to support and guide its customers with unique value-added services in ingredient flavor and function."

p&f+



Advanced Food Systems provides customized ingredient systems for a variety of applications, including meat and poultry products, frozen foods, sauces and marinades.

Courtesy of Solina



PROFILE: MAYA NJIE

Maya Njie shares, “Entering the perfume industry as a self-taught, independent perfumer presented several challenges. Without formal training or a background in chemistry, I had to find alternative ways to learn the craft.”

Maya Njie, Perfumer & Founder, Maya Njie Perfumes

Can you share a defining moment or significant breakthrough in your career as a perfumer?

Maya Njie [MN]: A defining moment in my career came in 2019 when my brand launched at Liberty in London. This partnership elevated the visibility of my work and gave me the opportunity to connect with a broader audience. Liberty’s commitment to supporting unique, artisanal brands made this collaboration deeply meaningful, especially as a self-taught perfumer building my brand from the ground up. But while this was a significant milestone, I’m equally proud of the fact that my business, which I started entirely on my own, will be celebrating its tenth year next year. Reflecting on the journey so far, I’m grateful for the resilience and dedication that have carried me through the challenges of running a niche brand. While I have achieved much, I am fully aware that there is always more to learn in this fascinating industry. The fragrance world is endlessly complex and evolving, and I’m excited to continue expanding my knowledge and refining my craft. Every step forward reinforces my commitment to storytelling through scent, and I find joy in every new lesson learned along the way.

What were some of the biggest challenges you faced when entering the perfume industry, and how did you overcome them?

MN: Entering the perfume industry as a self-taught, independent perfumer presented several challenges. Without formal training or a background in chemistry, I had to find alternative ways to learn the craft. Reading books like The Chemistry of Fragrance and online resources such as Basenotes and Fragrantica, but mainly hands-on experimentation to understand the properties and interactions of different ingredients. Sourcing materials was another obstacle; as a small business, it can be difficult to access certain raw materials and purchasing required amounts, and I have to carefully budget to maintain the quality and quantity needed for my products.

Additionally, managing all aspects of production independently is a big job and requires meticulous attention to detail. Over time, as the brand has grown, I have started outsourcing certain elements of production to keep up with demand while still maintaining the artisanal quality that defines my work. Looking back, I’m proud to have built a growing business that will soon mark its tenth year. Every challenge has been a valuable lesson, and I’m enjoying the learning process as I delve deeper into the industry, understanding that there is always more to discover.



Name: Maya Njie

Title: Perfumer & Founder, Maya Njie Perfumes

Location: London, United Kingdon

Courtesy of Maya Njie

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What resources (books, courses, mentors) were most valuable to you in your development as a perfumer?

MN: The most valuable resources in my journey as a perfumer have been rooted in hands-on experimentation and self-guided research. Experimenting with ingredients and blending techniques has been essential for developing my style and understanding the nuances of each material. I often purchase samples to evaluate new ingredients, building my own personal library to draw from in my formulations. Online resources have been incredibly useful as well, from articles and forums to niche communities where knowledge is generously shared. Talking with other independent perfumers in the community has provided valuable insights and a sense of camaraderie, as we all learn from each other's experiences. The process has been both solitary and collaborative, allowing me to grow at my own pace while tapping into the broader indie perfumery world. There's still so much to learn, and I look forward to continuing this exploration with a sense of curiosity and a commitment to evolving as a perfumer.

How do you find the right balance between artistic expression and the technical limitations of perfume formulation?

MN: Balancing artistic expression with the technical limitations of perfumery requires a blend of creativity, knowledge, and adaptability. For me, it begins with a story or memory that I want to bring to life through scent. Once I have a clear vision, I dive into the technical aspects, working within the constraints of available materials and regulatory requirements. These limitations can feel restrictive at times, but I see them as opportunities to push my creativity further. If a particular ingredient doesn't behave as expected or has regulatory restrictions, I experiment with alternatives that capture a similar essence. This process requires patience and a willingness to adapt, allowing me to maintain the artistic integrity of the fragrance while ensuring it is safe, stable, and wearable. Ultimately, I'm constantly learning how to navigate this balance, and I find it both challenging and rewarding. Embracing the technical side of perfumery has deepened my appreciation for the craft, and I'm excited to continue evolving in this industry, knowing that each fragrance I create is the result of both inspiration and technical considerations.

Are there specific skills or knowledge areas you believe are crucial for a perfumer to master?

MN: Absolutely. A comprehensive understanding of raw materials is needed. Knowing the properties, strengths, and interactions of different ingredients is essential for creating balanced, complex scents. Olfactory memory is another great skill—being able to identify, recall, and describe scents accurately allows a perfumer to make intentional choices in their formulations. Two areas that I am always learning about. Regulatory knowledge is also important, especially for independent perfumers who must ensure that their creations comply with industry standards. Beyond these technical skills, creativity, patience, and adaptability are essential traits. Perfumery is a field that requires experimentation and persistence, as not every formula or idea will work. I also believe that building a library of ingredients and practicing blending techniques over time are invaluable for developing one's craft. Personally, I recognize that I have much to learn, and I'm embracing this journey wholeheartedly. There is room and time to grow. The perfume industry is complex and ever-evolving, and I am enjoying the process of learning more with each fragrance I create. My aim is to continue evolving as a perfumer by refining my skills and deepening my understanding of this fascinating art form. p&f+





Bacon flavors can be achieved with ten ppm of 2,6-dimethyl pyridine to give a burnt note.



BY JOHN WRIGHT
johnwrightflavorist@gmail.com

Flavor Bites:
2,6-Dimethyl Pyridine in Savory, Nut, Brown and other Flavors

Learn about the diverse range of applications for 2, 6-dimethyl pyridine.

2,6-Dimethyl pyridine, sometimes called 2,6-lutidine (FEMA # 3540, CAS # 108-48-5) is an obvious candidate to replace pyridine in flavors. A quick look at the excellent VCF database shows just how widely pyridine is found in foods and what a challenge it can be to replace.

Pyridine has a very harsh, burnt profile, almost edging into ammoniacal. Higher molecular weight members of the pyridine family branch out into very different directions, many of them vegetal. The practical choice boils down to four low molecular weight alternatives, 2,4-dimethyl pyridine (FEMA # 4389), 2,6-dimethyl pyridine (FEMA # 3540), 5-ethyl 2-methyl pyridine (FEMA # 3546) and 3-ethyl pyridine (FEMA # 3394).

3-Ethyl pyridine is an excellent option and is the most widely used. The only drawback is a weak vegetal note. 2,6-Dimethyl is by far the nearest challenger in respect of use levels. Use levels are only a quarter of those of

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3-ethyl pyridine but 2,6-dimethyl pyridine is several times stronger, pretty much balancing the equation. 2,6-Dimethyl pyridine has a modest cocoa character, which can be an advantage in some flavor categories.

Note that the dose rates given throughout this article are the levels suggested for use in flavors intended to be dosed at 0.05% in ready-to-drink beverages or in a simple bouillon.

Savory Flavors

Bacon: Bacon flavors need an obviously noticeable burnt note. 2,6-dimethyl pyridine does the trick at ten ppm. Higher levels can be pungent but still interesting.

Beef, Roast: The same comments apply to roast beef flavors. Widely different levels give widely different results. Five ppm is a good, modest, starting level.

Cheese, Cheddar: Cheddar cheese notes align with the profile of 2,6-dimethyl pyridine very well. Two ppm is effective.

Chicken: 2,6-Dimethyl pyridine can find a home in all styles of chicken flavors, ranging from two ppm in boiled chicken to five ppm in roast chicken.

Garlic, Fried: Five ppm of this chemical gives a freshly fried character to cooked garlic flavors.

Ham and Pork: Both ham and pork flavors are lifted and enhanced by one ppm of 2,6-dimethyl pyridine. Smoked ham flavors can use much higher levels, up to ten ppm.

Mushroom, Cooked: Cooked mushroom can have an obvious pyridine note. 2,6-Dimethyl pyridine is a good replacement alternative at around five ppm.

Onion, Toasted: Similarly, all styles of cooked onion flavors are enhanced by five ppm of this ingredient.

Pepper, Bell Roasted: Cooked bell peppers have a distinctive character, and 2,6-dimethyl pyridine plays a useful part at around five ppm.

Rice, Cooked: 2,6-Dimethyl pyridine is not the first ingredient that comes to mind to drive cooked rice flavors, but it enhances the cooked effect at two ppm.

Seafood: Cooked white fish flavors only need around two ppm of 2,6-dimethyl pyridine. Clam and shrimp flavors need a little more, around five ppm. Seaweed flavors can easily take ten ppm and more.

Smoke: Smoke flavors cover a range of different profiles. Mild, soft flavors work well with around 20 ppm of 2,6-dimethyl pyridine.

Brown Flavors

Chocolate and Cocoa: Levels of 2,6-dimethyl pyridine in chocolate flavors are typically around five ppm. Higher levels, up to ten ppm, are clearly better in cocoa flavors.

Coffee: Pyridine can have a considerable impact on the profile of freshly roasted coffee and the choice of a replacement is particularly important. 2,6-Dimethyl pyridine is quite harsh at 20 ppm, but this harshness is not out of place.

Malt: In contrast, only a hint, around two ppm, gives a subtle boost to malt and malted milk flavors.

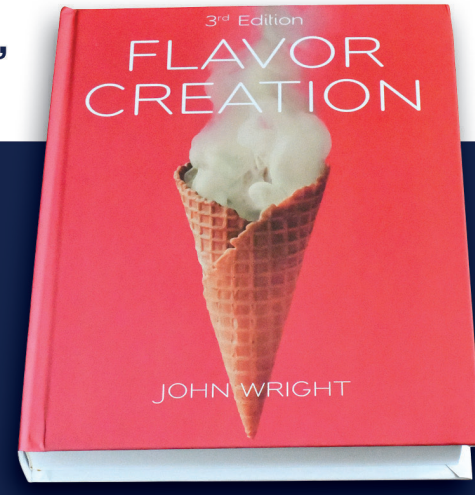
Molasses: The use of 2,6-dimethyl pyridine in dark brown sugar flavors is decidedly optional, but it does boost molasses flavors significantly at one ppm.

Vanilla: This can be a dangerous ingredient in vanilla flavors because it can enhance smoked notes. Cautious additions, around five ppm, in vanilla bean flavors can work well.

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Nut Flavors

Almond: The ideal level of 2,6-dimethyl pyridine in toasted almond flavors is around five ppm.

Hazelnut: Hazelnut flavors often have a more assertive roasted note and the ideal level of 2,6-dimethyl pyridine should be nearer ten ppm.

Peanut: The same comments can be applied to peanut flavors and ten ppm is also ideal in this category.

Pistachio: Some pistachio flavors lean in the direction of toasted almond profiles. Five ppm of 2,6-dimethyl pyridine works well in this group.

Walnut: Much lower levels of 2,6-dimethyl pyridine, as low as one ppm, still have a distinct effect in walnut flavors.



Five ppm of 2,6-dimethyl pyridine works well in pistachio applications.

Other Flavors

Beer, Dark: This raw material is not helpful for light beer flavors, but it does enhance dark beer profiles at around one ppm.

Fig: Fig flavors are structured differently to many other categories of fruit flavor and a burnt note is not out of place. 2,6-Dimethyl pyridine can be used at one ppm.

Grape, Concord: 2,6-Dimethyl pyridine can only ever be a very minor ingredient in most fruit flavors, but the addition of a tenth of a ppm to Concord grape flavors can be helpful.



Fig flavors are structured differently to many other categories of fruit flavor and a burnt note is not out of place.

Milk, Condensed: Condensed milk and dulce de leche flavors span a wide range of profiles. They can range from the smooth and subtle up to the decidedly rustic. 2,6-Dimethyl pyridine is best suited to the rustic profiles and works well at two ppm.

Raisin: Raisin flavors, like fig flavors, are something of an exception within the fruit category in that subtlety is not essential. Moderate levels of 2,6-dimethyl pyridine work well, typically one ppm.

Rum, Dark: 2,6-Dimethyl pyridine can be used in all styles of rum flavors, but it is most effective in dark rum flavors. One ppm is a reasonable starting point.

Tea: The addition of 2,6-dimethyl pyridine to black tea flavors is quite logical and thirty ppm is a good starting level. Less logically obvious is the use of this ingredient in green tea flavors. Nevertheless, it works well at ten ppm.

Watermelon: Surprisingly, a hint of 2,6-dimethyl pyridine, around a tenth of a ppm, generates an interesting effect in watermelon flavors.

Whisky: Whisky flavors cover a range of profiles from smooth and malty to distinctly smoked. 2,6-Dimethyl pyridine works best in the latter category. A modest addition, around one ppm, can work wonders. p&f+

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The Global Flavor Industry Enters a 'Complex' and 'Rapidly Evolving' Phase, Says IOFI Executive Director

Sven Ballschmiede, executive director of the International Organization of the Flavor Industry, discusses regulation flashpoints, healthy food trend impacts and more.



Ballschmiede shares, "Innovations are addressing the increasing concern of resource scarcity, with efforts aimed at developing alternative flavoring ingredients and reducing the environmental footprint of food production."

Image by Paul at Adobe Stock

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Sven Ballschmiede is the executive director of the International Organization of the Flavor Industry (IOFI). *Perfumer & Flavorist+* connected with Ballschmiede to discuss his current assessment of the flavor industry and what innovations he sees on the horizon.

How would you assess the current state of the global flavor industry, particularly in light of recent global challenges?

Ballschmiede: The global flavor industry is navigating a complex and rapidly evolving landscape. While the sector continues to grow, it faces significant challenges, such as disruptions in global supply chains and climate change impacts on food production.

Recent regulatory changes, particularly stemming from the European Union, are heavily influencing the global market. For example, the updated European Food Safety Authority (EFSA) guidelines on flavoring safety evaluations, the recent ban on smoke flavorings in the EU or the EU Green Deal implementation, etc., are having ripple effects worldwide.

Despite these hurdles, flavorings remain essential in offering affordable and sustainable nutrition, particularly in addressing health concerns and promoting food innovation, and of course taste remains a key driver for consumers' choices.

The role of the flavor industry, in this context, is both to enhance product enjoyment through great flavor and taste, and to create flavors that support healthier eating habits, enhance food security and address sustainability.

What are the key segments within the flavor industry where you see the most exciting innovations happening right now?

Ballschmiede: Exciting innovations are emerging in several key areas. In response to steadily growing health consciousness, the development of flavorings for low-sugar, low-salt, and low-fat foods is rapidly advancing. There is also a strong focus on plant-based alternatives, particularly in the dairy and meat sectors, as consumer demand for healthier and more sustainable products increases.

Innovations are also addressing the increasing concern of resource scarcity, with efforts aimed at developing alternative flavoring ingredients and reducing the environmental footprint of food production. New technologies have emerged like advanced encapsulation techniques, microbiological processes, or high-precision fermentation. These technologies are not only sustainable, but they also enhance sensory experiences in healthier food profiles.

Which flavor industry segments are encountering the most significant obstacles, and what are the driving factors behind these challenges?

Ballschmiede: The flavor industry constantly faces regulatory and market-related challenges. Regulatory measures, particularly those related to the safety and approval of certain flavoring substances, are becoming increasingly stringent.

The shift towards hazard-based approaches in regulatory assessments, like those seen in the EU, adversely impacts innovation and creates barriers for certain ingredients.

Additionally, consumers' expectations, lifestyles, and eating habits require constant adaptation, but our industry is perfectly capable of providing adequate and multiple alternatives.

Are there any recent updates, initiatives, or projects from IOFI that you would like to highlight?

Ballschmiede: IOFI continues to support its members with valuable resources and initiatives. Recently, we released an updated version of the "Country List" in the



Sven Ballschmiede

Courtesy of IOFI



"The flavor industry is vital in advancing global sustainability goals by ensuring that flavorings are safely produced and responsibly sourced," said Ballschmiede.

IOFI Regulatory Database, which helps members stay informed about regional regulatory changes.

We also published the “Guidance Document for Specifications of Chemically Defined Flavoring Substances,” which is available to our members. This document provides general guidance to ensure chemically defined flavoring ingredients used in food are safe and meet consistent quality standards.

Additionally, we released a revised Global Reference List (GRL) of Natural Complex Substances (NCS). This open-ended compendium of flavoring materials, considered safe for their intended use by an internationally recognized assessment body, is publicly available on our website.

Furthermore, we are rapidly advancing the Scope 3 project, which aims to address sustainability challenges within the flavor supply chain and help the industry better understand its environmental footprint.

This project, built as a data repository, covers emission factors for more than 160 key ingredients used in the flavor industry. It will serve as a valuable reference point for industry players to better understand their CO2 emissions and will be a precious resource and source of knowledge to advance in their sustainability journey.

How does IOFI envision the future of the flavor industry over the next decade, especially with evolving consumer preferences and technological advancements?

Ballschmiede: The future of the flavor industry is closely linked to growing consumer demand for health-conscious and environmentally sustainable products. IOFI envisions an industry that continues to contribute to society by developing flavorings that taste great, align with health trends and help address food resource scarcity.

The flavor industry will be essential in creating innovative solutions that minimize environmental impact while maintaining taste and consumer satisfaction. Technological advancements, such as the use of biotechnology and green chemistry, will drive the development of environmentally friendly ingredients and more sustainable flavoring options. This commitment to innovation is underscored by the industry’s significant investment in research & development, which averages 8-10% of its turnover. In summary, the industry’s adaptability to evolving trends and technological changes will be crucial to its success over the next decade.

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What role do global sustainability goals play in shaping the direction of the flavor industry from IOFI's perspective?

Ballschmiede: Sustainability is a core value that drives IOFI's mission. The flavor industry is vital in advancing global sustainability goals by ensuring that flavorings are safely produced and responsibly sourced. By prioritizing environmentally friendly practices, IOFI helps promote biodiversity conservation and reduce the environmental impact of flavor production.

In that context, the IOFI-IFRA Sustainability Charter serves as the cornerstone of our sustainability efforts and continues to grow with an increasing number of signatories. Based on the five key focus areas, the voluntary charter acts as a catalyst, encouraging broad industry participation and driving continuous improvement in sustainability practices.

IFRA and IOFI are working to update and enhance the toolbox accompanying the Charter, providing resources for signatory companies to support the commitments outlined.

The objective of this revision is to offer a more user-friendly, comprehensive, and tailored set of tools, particularly aimed at helping small and medium-sized enterprises (SMEs) advance in their sustainability journey.

How is IOFI helping the industry navigate complex regulatory environments and the increasing demand for transparency?

Ballschmiede: IOFI provides robust scientific and regulatory support to help the industry navigate an increasingly complex regulatory landscape. Our efforts include regional advocacy, sharing best practices, and educating stakeholders on key regulatory changes.

IOFI also monitors global legislation to ensure that its members have the information that they need to remain compliant with evolving requirements. IOFI regularly updates the Code of Practice and the Global Reference List, ensuring that industry standards align with international safety and quality expectations.

In addition, IOFI is actively involved at Codex Alimentarius and the Joint Expert Committee on Food Additives (JEFCA), promoting global harmonization of regulations. This proactive engagement streamlines global regulations, helping to reduce trade barriers and facilitate smoother international commerce.

In recent years, we have significantly ramped up our efforts and are committed to further strengthening collaborations with key Codex members.

In what ways is IOFI supporting innovation in areas such as biotechnology and natural flavor sourcing to meet changing market demands?

Ballschmiede: IOFI aims at ensuring regulatory frameworks enabling constant innovation to the benefit of end consumers, including the use of biotechnology. Regarding natural flavor sourcing, we are particularly active in adapting to changing market demands and evolving regulatory environments.

We have launched several initiatives, including training for members on the new Corporate Sustainability Due Diligence (CSDDD) directive, which will impact sourcing practices within the industry. Furthermore, IOFI is committed to activities linked to the Nagoya Protocol, which stipulates access and benefit-sharing, with respect to traditional knowledge associated with genetic resources in sourcing operations.

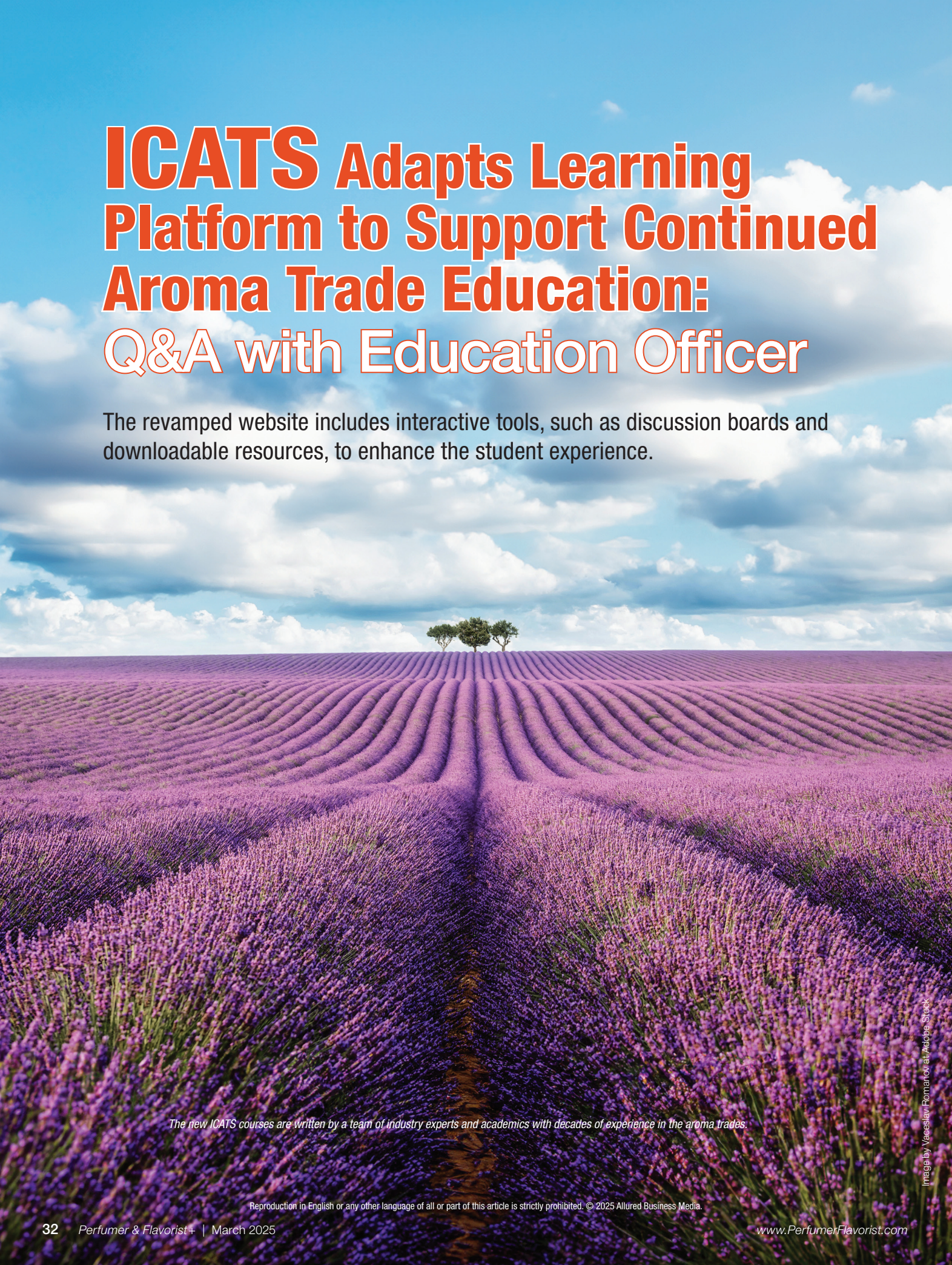
At IOFI, we have also undertaken significant work around the upcoming EU Deforestation Regulations (EUDR) and its scope, enabling our members to prepare for important changes in sourcing natural resources.

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ICATS Adapts Learning Platform to Support Continued Aroma Trade Education: Q&A with Education Officer

The revamped website includes interactive tools, such as discussion boards and downloadable resources, to enhance the student experience.



The new ICATS courses are written by a team of industry experts and academics with decades of experience in the aroma trades.

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It's often said that one's education doesn't end at graduation, but should be a lifelong endeavor to learn more about the profession. This is certainly true in the flavor and fragrance industries, where changing regulations and new research provide several opportunities for continued learning.

The International Center for Aroma Trade Studies (ICATS) was created by industry expert Tony Curtis to meet the industry's need for flexible yet rigorous specialist education. Accredited by the International Federation of Essential Oils and Aroma Trades (IFEAT), ICATS provides quality learning materials for continuing professional development for those in the aroma trades. Students need not be IFEAT members, allowing for more widespread education within the industry.



Lindsay Smith, education officer, IFEAT

Lindsay Smith, education officer at IFEAT, spoke with *Perfumer & Flavorist+* about the new ICATS learning platform and revamped website and how this will help professionals in the industry continue to expand their knowledge.

Can you provide an overview of the new courses available at ICATS? What are some of the key topics covered?

Smith: With the outstanding support of IFEAT, ICATS has recently updated its course offerings to better align with the evolving needs of the flavor and fragrance industry. Currently, there are now 14 units exploring key topics such as:

- **Foundation Chemistry and Biochemistry for the Aroma Trades:** Exploring the essential chemistry and biochemistry concepts that form the foundation of perfumery and flavor creation.
- **Anatomy and Physiology Principles for the Aroma Trades:** Understanding how we perceive odors and flavors through sensory mechanisms, providing essential insights into the olfactory and gustatory systems for industry impact.
- **Regulations in Practice in the Aroma Trades:** Providing insights into global regulations, this unit ensures compliance and understanding of legal standards in the industry.

How have the course offerings evolved to meet the current demands of the flavor and fragrance industry?

Smith: Our professional development offerings have been refined to address the evolving needs of the industry and IFEAT members, with courses continuously updated to incorporate technological and pedagogical advancements, along with flavor and fragrance trends, ensuring both relevance and practical application. By catering to both IFEAT members and the wider aroma trades community, ICATS delivers education without borders.

What considerations were taken into account when designing the new courses? How do they cater to different levels of expertise?

Smith: In designing these units, ICATS prioritized industry relevance, meeting the professional development needs of IFEAT members, technological progress, and varying expertise levels among flavor and fragrance professionals. The units are structured to accommodate all proficiency levels, providing foundational units for beginners, and advanced topics for seasoned professionals, ensuring learners at every stage can benefit and effectively apply their knowledge in their careers.

With the new education platform, how has the online learning experience been enhanced for students?

Smith: ICATS has developed a bespoke learning platform that offers an intuitive and user-friendly interface, making navigation through course units seamless for students. The platform is designed to support asynchronous learning, allowing students to access materials and complete tasks at their own pace, providing greater flexibility for busy schedules. Enhanced layouts and structured course units provide clear learning paths, whilst multimedia content such as videos, podcasts, quizzes, discussions, and forums make the learning experience engaging and dynamic. Personalized progress tracking ensures that students can monitor their achievements effectively, and tutors can monitor student progress in real-time.

Are there any new interactive features or tools on the learning platform that support the learning process?

Smith: Yes, the new learning platform introduces interactive tools such as discussion boards for peer-to-peer and mentor engagement, built-in quizzes for self-assessment, and downloadable resources for offline

Image courtesy of ICATS



The platform includes interactive elements, such as discussion boards for peer-to-peer conversation.

learning. The learning platform also supports multimedia-rich content, ensuring diverse learning styles are catered to, and allows students to leave feedback, or ask questions directly within course units.

How has ICATS ensured that the revamped website, learning platform and courses are accessible to a global audience?

Smith: The ICATS website and learning platform embrace universal accessibility through responsive design that works seamlessly across devices and browsers. To serve our diverse global community, the platform features adjustable text sizes, video captioning, and will soon introduce multilingual support where appropriate. With content designed to accommodate international time zones and enrolment open to both IFEAT members and non-members worldwide, ICATS delivers flexible, barrier-free education to fragrance and flavor professionals everywhere.

How does ICATS plan to continuously adapt and improve the course content and online platform?

Smith: ICATS collects regular feedback from students, tutors, mentors, and IFEAT members to identify areas for improvement. A dedicated team reviews course materials to ensure that they remain relevant and aligned with industry standards. The learning platform itself benefits from continuous updates, which incorporate cutting-edge features and enhanced security. This ongoing approach ensures a continuously updated and modern learning experience.

How do you envision the role of ICATS evolving in the next few years within the industry?

Smith: Supported by IFEAT, ICATS is poised to become a prominent leader in specialized aroma trades education, leveraging technology to expand its reach and impact. By collaborating with industry experts and IFEAT members, introducing more advanced courses, and staying ahead of trends, ICATS aims to address emerging challenges and opportunities. Its role will likely evolve to include broader certifications, partnerships with global organizations and education institutions, and an expanded network of experts dedicated to lifelong learning in the aroma trades.

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Sniffing Out the Future: **Airzai's Smart Tech is Disrupting the Fragrance Game**

Co-founder and CEO Muneeb Mushtaq explains the research behind his company's mood-enhancing scents, and where he sees technology leading the wellness and fragrance industries.



Airzai is a direct-to-consumer brand that seeks to bring a new way of diffusion to the world of home fragrance.

Images courtesy of Airzai

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The role of scent in the wellness industry has evolved over the last five years since the COVID-19 pandemic. In fact, The Global Wellness Summit even listed fragrance's role in wellness as a key trend for 2019. Researchers and consumers alike are more aware of the links between the olfactory system and overall wellness. The result: a new category of fragrance products aimed at enhancing mood through neuroscience-backed research.

Airzai first launched in 2019 with "Aroma," a premium smart home diffuser backed by neuroscience for mood enhancement. Since its launch, the company has become one of the largest seed-funded startups in Canada in its category. Airzai currently has four scents available for use with its diffuser: Eternal Energy, Mindful Meditation, Serene Sleep, and Peacefully Productive.

Perfumer & Flavorist+ spoke with Muneeb Mushtaq, CEO and co-founder of Airzai, about his journey to becoming a successful startup and the science behind the crafted scents.

What was the inspiration behind Airzai?

Muneeb Mushtaq [MM]: We came up with the idea of Airzai because of our past experience in technology and our passion for fragrances. So we looked at how fast the smart home industry is growing, and we realized that there's a big space in the scent industry where companies are not really looking at how this age-old industry can be disrupted. And that made us curious and started playing around with different ways of delivering this in a way that resonates with the modern age.

We came across the wellness aspect when we realized that the neuroscience behind our olfactory system plays a vital role in wellness, and so we got a team together of clinical psychologists, neuroscientists, even hypnotherapists and had a discussion around how effective scents could be on our mental wellness. It became a fusion of fragrances along with smart technology and pairing that up with wellness and boom, that's where Airzai came into being.

Tell me a bit about your journey to becoming Canada's largest seed-funded startup in this category.

[MM]: So it didn't come by chance. So, you know, our co-founders have had a history, including myself, of building successful startups, and our network was really keen on seeing what the next thing we're going to create is, what we're going to build. Hence, once we started Airzai, there was already an existing interest in getting into it, even though we were bootstrapping for the longest time. It started off as a passion project, so for the first few years we were just building it, brainstorming, and playing around with different versions of what Airzai would look like. So we had no idea how far we could take it or how big we could build it, and so being the largest seed-funded startup in this category at that time was something that was truly humbling for us to see the response and excitement and appetite for a product like Airzai.



Muneeb Mushtaq, co-founder and CEO

Did you work with neuroscience experts to create this product? What was the collaboration like?

[MM]: Absolutely. We still continue to work with our neuroscientists, clinical psychologists, and even hypnotherapists. For example, Marissa Peer is an investor in the company and she's a renowned hypnotherapist who's known for her work and best-selling books. And so when we collaborate, we work with these award-winning leaders in their industry. It's so refreshing to create products that can truly bring value to our users, our customers, our end users. And so we're truly excited to continue to build on that and not only just focus on neuroscience, but also bring scents that smell amazing, smell luxurious, and smell exotic. So there are different collections that we're going to be looking forward to introducing in the near future as well.

Can you give a brief overview of the neuroscience behind mood-boosting fragrances?

[MM]: So there are multiple factors that we and our fragrance partners deploy in order to ensure that we're using our scents effectively on three different aspects. We call them biosensors to study the impact of fragrances on our target audience and their emotions.

The first one is the expressive component, which we call the behavioral component, where we are tracking facial expressions and also eye tracking. So we understand that once we create a scent, how's that impacting [the user]? And there's different biomarkers that help us understand if it's relaxing, it's energizing, it's meditational, what brainwave it is impacting.

Then we go on to the visceral component, which is physiological measures. For example, we check the heart rate. Of course, we do EEG (electroencephalogram reading), where we place a headband on a subject's head and understand how the brainwaves are changing. In fact, we were one of the first companies in home scenting and fragrance that have actually filed a patent in connecting brainwaves with the scent that the user would be inhaling. And then we have the galvanic skin response, where we can actually see how it's impacting the change in temperature and the response of the human body and a physiological level.

And the third thing we do is a neurocognitive test, which is a questionnaire. So we asked very specific questions that are made by neuroscientists and psychologists to understand the response and the results of each of the scents that we expose to our test audience, and then we understand how it's impacting them. So we go very deep into understanding how well the scents are being perceived, and how they will surely be bringing that emotional aspect that our users and our customers would desire.

How does AI factor into this product?

[MM]: So we haven't shared much publicly about how AI would be working with our device as we're still building it. Building the AI features actually requires a lot of capital, and we have been very proactive in



Mushtaq shared, "We came across the wellness aspect when we realized that the neuroscience behind our olfactory system plays a vital role in wellness."





not only deploying the capital, but also securing IP and patents. Primarily the idea is to offer a personalized wellness experience through Airzai. And so what that would mean is that not only would we be able to understand your space, and how to make sure that it's properly scented at all times, but we would have a very good idea and prediction model to understand what your mood will be. And based on that recommend and diffuse the scent that would really regulate your emotional state.

Again, we're looking forward to sharing a lot more in the near future as we continue to develop the features and bring them to our customers.

In your opinion, how is scent technology transforming the wellness space?

[MM]: I feel it's in the very early stages, and I think there's a lot of education that needs to happen. People still don't understand how sensitive our sense of smell is, or how our olfactory system works. Out of the five senses, the olfactory system is the most sensitive sense we can have. We want to be at the forefront of being the leading brand that really truly dives into the science behind scents and the science behind olfactory systems and really integrates that into the wellness space. Are there other brands that are tapping into this? Of course, it is an up-and-coming trend, but we have truly disrupted that and have actually also secured IP behind it as well.

How do you think automation and AI will factor into the fragrance industry in the years to come?

[MM]: Big, big, big time. I think with every industry getting disrupted by AI and automation, and I think the fragrance industry is ripe for disruption. So we feel that Airzai is really well-placed in this specific space, which is quite empty right now and we're very excited to be at the forefront of all of this.

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Sipping on the Run: RTD Coffee and Tea Market Emphasizes Convenience, Health

Busy consumers are seeking coffee and tea drinks that are convenient, delicious and nutritious.



BY EMILY LITTLE, Associate Managing Editor, *Perfumer & Flavorist+*



Image by Saachka Pro at Adobe Stock

Globally, the ready-to-drink coffee and tea market was projected to reach $44.64 billion in 2024 and is expected to grow at a rate of 12.8% by 2029, according to data from Statista.

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Today's consumers are becoming increasingly busy, and they may not always have time to make a fresh pot of coffee or tea. They want something they can quickly pull out of the refrigerator and sip on the go.

Globally, the ready-to-drink coffee and tea market was projected to reach $44.64 billion in 2024 and is expected to grow at a rate of 12.8% by 2029, according to data from Statista. Further, user penetration is at 10.4% currently and expected to reach 12.8% by 2029. The top countries in 2024 in terms of revenue were China, the United States, Japan, South Korea, and Germany.

Both markets are growing, with iced coffee growing at a more rapid pace and iced tea growing at a slower, steadier pace. According to Innova Market Insights, ready-to-drink coffee is most often consumed at breakfast, while its tea counterpart is most often consumed at lunch.

"The altering lifestyles, which encourage on-the-go eating, and a growing trend of replacing meals with smaller nutritious snacks and drinks have resulted in the adoption of ready-to-drink tea and coffee," states an analyst with ResearchAndMarkets.com. "The increasing prevalence of on-the-go consumption, particularly among the urban and younger demographics, has significantly contributed to its market growth."

Quick Cup of Joe

Coffee is already a well-established and popular flavor. In fact, flavor producer Esarom named coffee as its flavor of the year for 2025, calling it a "sensory delight" with its wide range of flavors.

"Coffee flavor is more like an experience–less of a single sensory impression," said Susanne Winter, marketing manager at Esarom.

The ready-to-drink coffee market saw a revenue of $11.9 billion in 2024, mostly from supermarket and convenience store outlets, according to data from Statista. This revenue is projected to grow at a rate of 2.97% annually over the next five years.

"One of the main reasons for the growth of the ready-to-drink coffee market in the United States is the changing preferences of consumers," said an analyst with Statista. "With busy lifestyles and increasing urbanization, consumers are looking for convenient and on-the-go options for their coffee fix. Ready-to-drink coffee provides a convenient solution for consumers who want to enjoy a cup of coffee without the hassle of brewing it themselves."

According to market intelligence company Spate, canned coffee experienced the largest increase in both volume and year-on-year growth in 2024. Further, coffee content has seen a year-on-year increase of 64.7% on social media platform TikTok. Popular hashtags by total views include #icedcoffee (3 billion views), #espresso (1.5 billion views) and #coldbrew (722.2 million views).



Consumers tend to prefer indulgent flavors in their ready-to-drink coffee.

When it comes to flavor, brown flavors continue to dominate the coffee category, which includes staples such as caramel and chocolate. But some newer flavors are beginning to make their mark. According to Innova Market Insights, product launches flavored with spices and seeds have seen an 18% increase over the past four years.

Regionally, chocolate is the preferred coffee flavor in Europe, Asia Pacific, Central and South America, and the Middle East and Africa, according to GlobalData. In North America, Vanilla is the most appealing coffee flavor. Further, European consumers listed hazelnut as the third most popular flavor.

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Further, consumers are using their ready-to-drink coffee purchases as a small indulgence. International Delight's collaboration with Oreo and Victor Allen's collaboration with Twix shows the fusion of indulgence treats and convenient coffee.

"Rich, indulgent flavors like Ferrero Rocher Frappuccino and gingerbread latte are growing in popularity, highlighting consumers' desire for dessert-like coffee experiences," Spate's annual coffee report states. "Brands can capitalize on this trend by offering blends inspired by popular desserts, such as tiramisu or chocolate mousse."

But Spate's report says this doesn't mean coffee lovers aren't looking for health benefits, too. In fact, coffee beverages have been influential in the functional foods trend, specifically for its energizing effects.

Fancy a Spot of Tea?

Of course, there are those who prefer tea over coffee, and they have the same expectations from their ready-to-drink options. The ready-to-drink tea market is valued at $110.3 billion in 2024, according to Statista, and is expected to grow annually by 3.62% over the next five years. However, health concerns drive this category more than convenience compared to the ready-to-drink coffee market.

"Consumers worldwide are increasingly seeking healthier beverage options, and this trend is driving the growth of the ready-to-drink tea market," stated an analyst with Statista. "Ready-to-drink teas are perceived as a healthier alternative to carbonated soft drinks and other sugary beverages. They are often made with natural ingredients and contain fewer calories and less sugar. Additionally, ready-to-drink teas offer functional benefits, such as antioxidants and herbal extracts, which further appeal to health-conscious consumers."

The Tea Association of the USA noted in its annual State of the Industry report that while dollar sales remain strong in this category, volume is still a challenge, with a 2-3% decrease in gallonage.



The ready-to-drink tea category also lends itself to the value-added, functional beverage trend.

Image by V-anila at Adobe Stock

Tea lends itself to various flavors, from bright and fruity to warm and spicy. Innova Market Insights' data shows that 28% of new tea launches in the last year had fruit flavors, and 16% of new launches had spice and seed flavors. Furthermore, botanical teas make up another 16% of new product launches, and have seen an increase due to the growth of chamomile as an ingredient. This flavor is associated with soothing and relaxation.

"Consumers say their ideal RTD tea is not bitter, somewhat sweet with a green, black, herbal or white tea base," states Symrise Flavor's insights on tea flavors. "Preferred and core flavors include peach, mango, lemon and unflavored, while honey, vanilla and hibiscus are trending. In terms of health claims, organic and antioxidants are growing."

The ready-to-drink tea category also lends itself to the value-added, functional beverage trend. Popular launches with functional claims include POM's Pomegranate Elderberry Boost Tea, Teavana's Defense Cinnamon White Tea, and Hoplark's The Calm One Sparkling Hop Tea.



Looking to the Future

As this trend continues to grow, food and beverage companies will need to continue to elevate their ready-to-drink offerings. Consumers expect premium products with high-quality ingredients in both the coffee and tea segments.

Another area for growth for ready-to-drink coffee and tea is the use of social media. Brands like Starbucks, Dunkin Donuts, and Pure Leaf are leading hashtags on TikTok and frequently engage with audiences. Data from these social media platforms shows consumers are searching for creative options for their ready-to-drink beverages.

Both markets have an opportunity to strengthen their standing with younger consumers, specifically millennials, Generation Z and Generation Alpha. According to data from packaging manufacturer TetraPak, Gen Z and millennials are driving the demand for ready-to-drink coffee and tea in Southeast Asia because of their convenience-first lifestyle and drive for indulgence.

"They value convenience above all," TetraPak's report states. "Ready-to-drink tea and coffee are a good fit, because they offer a shortcut to gaining health and energy benefits, and they see these as beverages that will help them kickstart the day and provide energy without adding any extra stress."

Life moves fast for young consumers, and their coffee and tea needs to move with them.

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The panel of flavorists compared isomers of various ingredients.



■ BY CYNDIE LIPKA
Principal flavorist,
Bell Flavors and Fragrances

Flavor Report: US Edition

From geranyl acetate to cis-5-octenal, our panel of flavorists assesses the taste and odor characteristics of flavor ingredients.

I'd like to mention a bit of a diversion from the normal way in which I present materials for review and presentation to you. In two sets of instances, the panel compared a few isomers. Then we looked at two different botanical species of oil. Read on for all the insight! Please let me know if this is something you love or detest.

cis-3-Hexenyl salicylate

Source: M&U
FEMA# 4750 CAS# 65405-77-8
Naturally occurring: Cornmint, mango.
Odor @ neat: Sweet, green, light, fruit skin, plastic, fleshy, vegetative, herbal, phenolic, anisic, heavy, rubbery, creamy, tropical, background cooling.
Taste @ 2 ppm: Green, fleshy, slight plastic, waxy, skin, mango flesh, burnt, heavy mouthfeel, creamy, anisic, spicey, pear, green rindy.

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Taste @ 5 ppm: Bitter, plastic, green, slight floral, mango, pear, cucumber, melon, was too high for some. Very impactful compound.

Possible applications: Some found this to be helpful for rhubarb, mango, passionfruit, guava to help define the skin notes. If we consider other rind and skin notes, the panel suggested cucumber, melons and some savory herbs which would include perilla leaf, cumin, thyme and oregano. There seems to be a charred or burnt impact at higher dosages; the panel suggested burnt garlic and smoke profiles. As always, dose is of the utmost importance.

Neryl acetate, natural

Source: Avant Organics

FEMA# 2773, CAS# 141-12-8

Naturally occurring: Black currant, buchu, cardamom, celery, bergamot, bitter orange peel, Budda hand oil, grapefruit oil, kumquat, lemon, lemongrass, lime, mandarin, orange, pomelo, yuzu, clary sage.

Odor @ neat: Bright, fresh, lemony, slight floral, black pepper, sweet, bergamot, slight citrus, green, rosy, terpenic, piney, vegetal, candied, sweet.

Taste @ 1 ppm: A bit low, slight citrus, oily, lemon, light, juicy, celery, powdery.

Taste @ 2 ppm: Slightly soapy, green, citrus, floral, peel, fruit punch, piney, black pepper, heavy, floral, rose, oily, green pepper skin.

Possible applications: This *cis*-isomer really finds its home in citrus profiles to lend a bright, and almost waxy and tropical nuance. Turkish delight was mentioned as a flavor profile and to be honest, I needed to look it up and found it's made with bergamot and/or lemon oils with rose water. So, that sounds completely correct. However, the panel also thought that this is very worthy to add to blackberry, blueberry and raspberry profiles as well as peach, apple and mangoes, or even fruit punches. Some felt that broccoli and peppers (chili and black) would benefit from a touch.

Geranyl acetate, natural

Source: Avant Organics

FEMA# 2509, CAS# 105-87-3

Naturally occurring: Apple, chamomile, cardamom, celery, coriander, curry, eucalyptus, ginger, hops, laurel, lemon balm, lemongrass, mace, cornmint, myrtle, nutmeg, basil, rosemary, sage, tarragon, thyme, wormwood.

Odor @ neat: Lemongrass, waxy, celery, slightly mushroom, floral, cilantro, green, hops, herbal, pear, heavy, lemon balm, peely, candied, sweet, soapy, fruity, floral, rosy.

Taste @ 1 ppm: Tea-like, waxy, green slightly floral, slightly citrus, lime, fruit skin, green grape, light, floral.

Taste @ 2 ppm: Waxy, peel, fruit skin, green, late lemon, cilantro, strong, hops, bitter, heavy, floral, rose, oily, basil.

Possible applications: As we can easily see from the comments above, the trans-form of this isomer is not light and fresh but heavy and leaning a bit to the green side. Lots of mentions about hops which leads into thoughts about beer and of course cannabis. Cilantro, thyme, cardamon, tarragon and spice blends were mentioned as well. Pickled cucumber, pear (in particular Bartlett), melon, apple skin, also made our list of flavor profiles in which to test this.

Neryl butyrate, natural

Source: Avant Organics

FEMA# 2774, CAS# 999-40-6

Naturally occurring: Kumquat, mango, passionfruit, tea, wormwood oil.

Odor @ 1%: Floral, fruity, heavy, waxy, peel, tropical, sweet, peach, pear, unripened cheeses, sweaty, butyric note.

Taste @ 3 ppm: Slightly bitter, creamy, delicate floral, green, weak, melon, ripe note, tutti-fruity, waxy, fruity, tea-like, tropical, slight cheese.



The neryl acetate sample reminded some panelists of the flavor profile of Turkish delight.

Image by YuliiaMazurkevych at Adobe Stock

Taste @ 6 ppm: Fruity, floral, tea-like, tropical, pear, green, buttery, ripe, pear, waxy, citrus, heavy, berry.
Possible applications: Two carbons larger than the acetates, the cis-isomer butyrate will lend creamy notes and will act as an anchor to other lighter notes. Think of banana cream pie as an example of a good place to try this. Several fruit profiles come to mind such as pear, apple, plum, peach, mango, passionfruit, guava, papaya, pineapple, orange, mandarin, tangerine, grapefruit, and lemon (and lemon curd). Blue cheese and cheddar cheese were mentioned. There were several butyric notes mentioned by the panel as a whole.

Geranyl butyrate, natural

Source: Avant Organics
FEMA# 2512, CAS# 106-29-6
Naturally occurring: Grapefruit, kumquat, lemon, orange, yuzu, passionfruit, peanut, thyme, tomato, wormwood oil.
Odor @ 100%: Waxy, rose, sweet, fruity, apricot, floral, pulpy, hops, beer, citrus, fruit punch, heavy, cheesy, winey, soapy, green, generic fruity and berry notes, grapefruit, green tea, honey, becomes plastic on dry-out.
Taste @ 1 ppm: Weak, slight soapy note, mild fruity, green, grapey, floral, hops, some citrus, cherry, berries, grapefruit, yuzu, sweet, peach.
Taste @ 2 ppm: Sweet, peach, hops, waxy, fruity, green, floral, apple skin, peely, cannabis, grassy, grapefruit, bitter.
Possible applications: So, again, this isomer has commonality with neryl butyrate with both compounds being pretty heavy and some common notes with the geranyl acetate. Those two have hops/beer and cannabis characteristics in common. The citrus most often named was grapefruit. Other fruits mentioned were blueberry, apple, cherry, grape, guava, mango, peach, apricot, pear, cashew fruit, and generic tropical profiles. Some mentioned celery as well. The panel in general felt that this compound was much more complex than the neryl butyrate. And that it had less butyric notes as well.

cis-5-Octenal

Source: Bedoukian
FEMA# 3749, CAS# 41547-22-2
Naturally occurring: None
Odor @ 1%: Pumpkin, cantaloupe, green, pulpy, slightly rancid, melon, creamy, sweet, fatty, oily, cucumber skin, grassy, intense, potato, skins, lard, animalic, asafoetida, and painty on dry-out.



The botanical name of marjoram oil is Thymus mastichina, and this material originates from Spain.

Taste @ 1 ppm: Pumpkin, cantaloupe, honey dew, rind, vegetative, fatty, seafood, earthy, garlic, green, oily.
Taste @ 3 ppm: Aldehydic, pulpy, seedy, green, strong, waxy, soapy, animalic, fatty, oily, rancid, fish oil.
Possible applications: Holy cow! There are so many different directions you can go with this one! When I smelled this, my mind literally conjured up vivid images of scooping seeds out a pumpkin to carve for Halloween. Certainly, the panel agreed with that but also threw in other melons and cucumber skin. The fatty, oily, waxy notes will help all those profiles. But look in the other direction; this group found use in lard, animalic, salmon, shrimp, caviar, chicken fat and generic meat. There was garlic mentioned, broccoli, mushroom, and other vegetables.

Marjoram oil, sweet, P&N

Source: Excellentia
FEMA# 2663, CAS# 8015-01-8
Odor @ 1%: Sweet, slightly herbal, somewhat lemony, slightly basement, piney, floral, berry spicy, cooling, terpenic finishes woody, hay-like and tea like, and camphoraceous.
Taste @ 1 ppm: Tea-like, sweet, slight anise, mild, cooling, minty, floral, green.
Taste @ 2 ppm: Tea-like, chai, herbal, balsamic, camphoraceous, floral, perfumed, sweet, lovely, cooling, green, fresh, piney.

Image by Madeleine Steinbach at Adobe Stock

Possible applications: The botanical name here is *Origanum majorana*, and this is grown in Egypt. There is no punchy impact like oregano. The sweet, floral, fresh character would blend nicely and bring brightness to herb blends. I think this would be interesting to add to a black tea, jasmine tea and chai flavor and would also promote a different take as a small inclusion in mint profiles or even wintergreen. Savory mentioned shrimp and sweet mentioned mango, berries, wildberry, cola, cinnamon and maybe pink peppercorn.

Marjoram oil, P&N

Source: Excellentia
FEMA# N/A, CAS# 8016-33-9
Odor @ 1%: Piney, herbal, green, woody, camphoraceous, cooling, minty, terpenic, minty, balsamic, slight camphor with a very slight jasmine note on the dry out.
Taste @ 1 ppm: Lovely, herbal, piney, fresh, green, floral, camphor, cooling.
Taste @ 2 ppm: Herbal, piney, fresh, green, woody, peppery bite, camphoraceous, numbing.
Possible applications: The botanical name here is *Thymus mastichina*, and this material originates from Spain. It is a small wonder that the camphor notes are more dominant here. The panel felt that this material would work well in poultry spice blends, mirepoix, sausage, pizza spice, curry, beef and salsa, *Schinus molle* profiles and of course blend well in other herbs and spices. This species is much more cooling and minty than the sweet marjoram. The sweet marjoram had more sweet berry and tea notes.

Pyrazine mix no. 36, natural

Source: Excellentia
FEMA# N/A, CAS# N/A
Naturally occurring: Beef, beer, Swiss cheese, chicken, clam, cocoa, coffee, lamb, lobster, macadamia nut, malt, oats, peanut, pecan, popcorn, pork, potato (chips), rice cake, rum, rye, salami, sesame, shrimp, soybeans, spinach, squid, tea, wheat, wine, yeast.
Odor @ 1%: Mild for pyrazines, nutty, roasted, toasted, brown, espresso, dark chocolate, peanut skin, potato, sweet, almond, cracker/bready, sesame, crispy, yeasty.
Taste @ 0.5 ppm: Slightly green, nutty, toasted, bready, light brown, peanut skin, white cocoa extract, mild coffee.
Taste @ 1 ppm: Nutty, coffee, peanut, toasted, corny, cocoa, brown, creamy, fatty, bready.
Possible applications: This pyrazine aficionado is quite enamored by Pyrazine mix no. 36. We get some flexibility in our creative thoughts because it consists of a few different pyrazines. Certainly it is a good choice for lightly toasted profiles, like crackers, cakes, cookies, French toast, and toasted coconut. It is less harsh and is not musty which makes it a great candidate for all the nut profiles even the delicate ones. And let's throw sesame seeds into that as well. At higher levels the panel thought of chocolate and cocoa profiles and even coffee. A lot of meat profiles also came to our collective minds such as chicken, pork and some seafoods. Other thoughts were about yeast, or HVP replacers, and lastly cooked spinach.

2-Propyl-4,5-dimethyloxazole

Source: Treatt/Endeavour
FEMA# 4396, CAS# 53833-32-2
Naturally occurring: Beef, coffee.
Odor @ 1%: Green, vegetative and almost creamy, alliaceous, leafy, viney, crisp, celery, earthy, fresh asparagus, gasoline or painty note .
Taste @ 0.5 ppm: Low level, almost salty, radish, asparagus, vegetative, green.
Taste @ 1 ppm: Vegetative, celery, tomato vine, cabbage, asparagus, asafoetida, earthy, green, spinach.
Possible applications: This oxazole is very firmly planted in the vegetable aisle. There is a light creamy note in this material so creamed or cheesy vegetables, jalapeno ranch, and cream cheese with vegetables came to mind. The oniony and garlicy notes come through loud and clear with the panel suggesting garlic, onion, asparagus, asafoetida, radish, horseradish, wasabi, and cabbage.



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- FEMA 3142 CITRONELLIC ACID
- FEMA 2366 TRANS-2-DECENAL
- FEMA 3912 9-DECENAL
- FEMA 2374 DIETHYL MALATE
- FEMA 3137 2,6-DIMETHOXYPHENOL
- FEMA 4100 3,5,6-DIMETHYL-2-ISOBUTYLPYRAZINE
- FEMA 2431 ETHYL CYCLOHEXANE PROPIONATE
- FEMA 3492 ETHYL UNDECANOATE
- FLAVIS 13.132 FURFURYL HEXANOATE
- FEMA 2495 FURFURYLIDENE ACETONE
- FEMA 4121 GERANIC ACID
- FEMA 2535 GUAIACOL PHENYL ACETATE
- FLAVIS 2.163 2-HEXANOL
- FEMA 3983 TRANS-2-HEXENYL CAPROATE
- FEMA 3690 CIS-3-HEXENYL LACTATE NATURAL
- FEMA 2888 HYDRATROPIC ALDEHYDE DMA
- FLAVIS 9.643 METHYL GERANATE
- FEMA 2706 2-METHYL HEPTANOIC ACID
- FEMA 2865 PHENYLETHYL FUROATE
- FEMA 2952 PROPYLIDENE PHTHALIDE
- FLAVIS 13.17 L-ROSE OXIDE
- FEMA 3006 SANTALOL
- FEMA 3007 SANTALYL ACETATE
- FEMA 3599 TIGLIC ACID

For a complete list of all our natural, natural identical and synthetic ingredients visit us at www.pentamfg.com

Penta®

Penta Manufacturing Company

A Division of Penta International Corporation

4 Dedrick Place, West Caldwell, NJ 07006 ■ Phone: (973) 740-2300 ■ Fax: (973) 740-1839

E-Mail: sales@pentamfg.com ■ Web: www.pentamfg.com

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