

Building Smart: a Formula for Success

What it takes to formulate successful flavors—from trend tracking to material selection to compounding to trials to the store shelf

To me, the ideal flavor is one you can make with the fewest number of materials to get the desired result,” says IFF senior flavorist Dennis Kujawski.

This perspective is as true as it is deceptively simple, particularly in an age when project timelines and cost demands are shrinking even as new applications demand greater technical innovation and skill. “I equate making a flavor to painting a picture or creating a symphony,” says Kujawski. “You’re building something. There was a [time] when someone could simply blend a couple flavors together.” No more.

On a recent visit to IFF’s Dayton, New Jersey campus, *P&F* magazine received an inside look at how flavorists and flavor companies are creating successful flavors and meeting deadlines with a blend of skill and evolving technologies. Kujawski calls this process *building smart*. From selecting raw materials to compounding to trials to the store shelf, flavorists need to consider every detail and adjust according to the varied projects that come their way.

Cost and Time Efficiencies

“When a brief comes in,” says Kujawski, “we can look at our existing global [flavor] library. The whole industry has their top collection of best flavors for certain applications. If you [the customer] want it today, you can have it really quickly.” A good flavor library, he says, can address the specific needs of various applications.



“When bases are changed by nutritionally beneficial additives, the impression of the flavor may be compromised,” says senior flavorist Dennis Kujawski; pictured: IFF’s white tea and yuzu energy beverage featuring guarana; for more photos from IFF’s demo session, visit perfumerflavorist.com/photos

Photo by David Horrocks, courtesy of IFF

But because flavors behave differently depending on the base, modifications are typical. “The application is going to change the flavor somewhat depending on the processing,” says Kujawski. “In the base, your flavor may come out a little greener than you really want, so you may go back and modify that very quickly to get it out,” he says, which means that good flavor libraries still require good flavorists.

Kujawski’s thoughts on compounding minutiae, for example, are typical of his fine-tuned outlook: “There’s no reason someone in a plant should have to move a drum three times because the same ingredient is in three different things.” It’s all about the details. “We’re doing [our work within] a commercial and consumer guideline, especially on cost,” says Kujawski. “Like every other supplier in the world, our customers need us to be more cost-effective. One way we can do this is by judicious use of ingredients, and a good flavorist can make a great flavor with fewer materials.”

The Challenge of Nutritional Additives and Energy Drinks

“Sometimes, the flavors we have won’t work in a specific base,” says Kujawski. Either flavor materials don’t survive processing or the flavor just doesn’t taste the way the client wants. A major emerging issue in this part of the process is additives. “When bases are changed by nutritionally beneficial additives, the impression of the flavor may be compromised,” says Kujawski. With this growing sector, the demand for new flavor solutions is rising.

While a typical generic cola flavor can be turned around virtually overnight, new customer requests demand greater technical finesse. Newer types of beverages with high levels of fortification, such as soy or other proteins, are relatively new to the flavor industry and require flavorists to build from the ground up in innovative ways. For instance, says Kujawski, flavorists need to be very sophisticated when it comes to masking. “Some of this fortification can actually absorb flavor materials,” he says, “so a lot of trial and error has been required to improve the qualities of products such as energy drinks. A huge area now is protection and delivery of flavors in different environments.”

This sort of work requires much more of a flavor house’s resources than traditional projects. For instance, analytical services take time, which is something customers don’t have a lot of, so successful flavor houses need to be smart about allocating resources by weighing out the value.

The results of all this work can yield extremely novel flavor profiles in compelling applications. During a demonstrational at IFF's culinary center, overseen by executive chef Kevin McDermott, the company presents a white tea and yuzu energy beverage that features the high-caffeine ingredient guarana. The yuzu flavor was chosen, company representatives note, because other once-obscure materials such as acai and pomegranate have moved from obscurity to the mainstream. The possibility that yuzu could follow the same path is worth exploring.

The Role of Serendipity in Creative Innovation

"Serendipity can be pretty big in the flavor industry," says Kujawski, who explains that creating new flavors doesn't always mean starting entirely from scratch. He points specifically to previous experiments.

Kujawski gives the example of creating a strawberry flavor. Perhaps one experiment ends up less like strawberry and more like a pulpy mango puree type of character. Instead of just tossing out the results, the flavorist explains, it's worth noting the results for a future project that might require that sort of flavor profile. "We might go back to that [for a different project]."

"When analyzing natural materials, we look for novel molecules that have never before been reported. These new materials could be the gems we need for future applications."



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Anosmic considerations: The lifeblood of a flavorist's success is his or her collaboration and discussions with peers. While this has implications for creative give-and-take, it has a more immediate, practical use, namely anosmia. "Different people have different thresholds and abilities to smell different [materials]," says Kujawski.

Damascenone is a perfect example. "I love this material," he explains, "but I typically add it too high to a flavor. We work together as a team, and a colleague will taste [the formulation] and say, 'Dennis, cut that down half or five times.'" Anosmia can also be a factor for jasmine and musks.

Hitting Customer Targets

Of course, the top factor in flavor creation is the customer. The obvious parameters that Kujawski notes are the customer's processing setup and cost guidelines. "During the development process, clients may change their processing conditions or their bases," he explains. "They [may] decide to cost-reduce the base. In a nutritional product this could mean the client decided to put different vitamins in or reduce the fat, which has a huge effect on flavor release." It also helps to know if a base is available for screening and testing, he says. Dosage requirements are another consideration. Finally, and most importantly, it's important to set a realistic timeline, with the understanding that it may change according to client needs.

The primary liaison between the flavor house and customer is typically the sales person, who coordinates with internal staff. The flavorist, though, may work across a range of departments depending on the job, including marketing, R&D and applications. Given the amount of staff involved in any given project, direct communication with the customer is invaluable.

Maintaining a flavor language: “What we’re trying to do is make associations with what we smell and taste in a target and the raw materials we have available,” says Kujawski. “If we look at strawberries ... the white part near the top smells and tastes a bit different than if you just isolate the seeds.” That white part, in flavor parlance, would be called green. And every flavorist knows that green character can range from leafy green to fatty green. The key is to be specific. “The seeds might be very earthy-like in character,” Kujawski explains. “And then the other fleshy part might have a very juicy character.”

It’s crucial that this language be shared among flavorists, applications staff and customers to avoid a terminology Tower of Babel and ensure effectively communicated targets. In some cases, it’s a matter of letting a customer use their own language and then interpreting that terminology. On the consumer level, common flavor descriptors have little currency. “We try to get those [descriptors] down to the consumer level,” Kujawski says. “Trying to find how consumers think is what we’re looking at ... It can get interesting.” For example, “green” could mean a broad range of things to consumers, including grassy/fresh cut lawn to applelike to an unripe character. “We try to develop the same lexicon with our customer.”

Exploiting New Technologies

When it comes to flavors, natural is king. As natural raw materials have continually caught up with their synthetic counterparts, flavors are reaching new heights. Kujawski points out that peach flavors, for example, have grown more sophisticated and “real” compared to those of 20 years ago.

The IFF culinary center tasting session features the novel resurgence of a very old beverage, sake. Served hot, cold, warm and even “sparkling,” the beverage is an ideal showcase for new flavors. IFF’s demo sake features chilled pear and green tea flavors. The pear flavor was

derived from the company’s well-known Generessence (a trademark of IFF) project. Generessence employs sophisticated analyses of food products to aid flavorists in the creation of flavors that use only those components found in the named food. The aim is to make a truly nature-identical flavor—a Holy Grail in a world where customers are looking for increasingly “clean” labels.

A flavorist with Kujawski’s experience could turn around a basic banana flavor in no time, but the Generessence program aims beyond that. “If we’re making strawberry, I can only use those things found in strawberry. It would give a truly nature-identical flavor that’s applicable to all flavor types.” But it’s not as simple as doing a single dynamic headspace analysis and replicating the readout. “We may get a product back from R&D with four or five different analyses,” Kujawski continues. “If you made up a flavor with any one of those, it’s not really going to be what you want. It is up to the experienced flavorist to decide what components are important to put together the flavor that he or she wants.”

“We’re trying to understand nature—what happens when a fruit ripens, what’s some of the chemistry that takes place? That can lead us analytically to the discovery of new molecules and their synthesis.”

By drilling down to flavor specificity, IFF seeks to create not just apple flavors, but Macintosh flavors, not just pear flavors, but bosc flavors. Aside from added nuance and realism, the company is also seeking an intellectual property advantage, hoping Generessence will make its flavors more difficult for competitors to duplicate. Another Holy Grail.

The company developed its sake demo because there are indications that sake could go the way of vodka, with a wide array of flavors. Already, “saketinis” are appearing on drink menus, and RTD sake products are landing on store shelves. By combining this beverage trend with its flavor

program, the company is looking to intersect culinary authenticity and flavor technology.

Seeking new materials: Gas chromatography-olfactometry, Kujawski says, remains invaluable at the analytical stage. “We sniff out the end of the GC. Sure, we can see the peaks as it comes off, but there may be some areas where you don’t really see a peak, but wow, there’s something there. Or you get a slight blip and say, ‘That may be a really interesting material.’ What we really like to see is something that no one’s ever reported before in literature and actually smells really good.” When asked if there are any recent examples of this kind of breakthrough discovery, Kujawski is polite but tightlipped:

“Yeah, but I can’t talk about them.”

Flavor Outlook: Novel Profiles and Applications

During the tasting session, McDermott notes that an increasingly educated eating public is raising the bar on flavors. The demonstration illustrates how IFF sees its flavors fitting in with emerging culinary trends, providing a look forward.

A nontraditional ceviche features slightly steamed shrimp marinated in lime acid and presented with cilantro and red pepper paste paired with the company’s Thai red curry seasoning.

A gently Americanized version of *jal jeera* follows. This cumin beverage is popular in the Indian subcontinent as

an appetizer or intermezzo. The drink includes tamarind, salt, pepper, and the company’s ginger, mint and cooling flavors. From a Western perspective, the mix is delicious and unusual. This less traditional version features somewhat less heat and salt than in more authentic varieties. No one’s predicting that this will be the next chai, but the potential is obvious.

Next, a lemongrass, ginger and green tea smoothie shows off a Generessence tea flavor. The base is milk-shakelike and contains interesting notes of citral, with slightly “dirty” and citronellal facets. A low-level ginger flavor contributes heat.

A Thai coffee demo features a Generessence coffee flavor working in concert with cardamom and coriander, which lifts the coffee flavor and offers a hint of citrus/lemon.

Raw Material Discussion

During an informal discussion of raw materials, Kujawski presents a 1% dilution of jasmine oil. “Traces of this in a strawberry flavor give a beautiful ripeness and roundness to the flavor,” he says “These essential oils are really complete flavors in themselves—there may be 50 or 60 components making up jasmine oil. When I make a flavor, there’s a core part—a skeleton—a few ingredients that will be responsible for the primary characteristics, and then we go out to secondary and tertiary characteristics. Certainly this [jasmine oil] would be part of a tertiary of a strawberry.”

Passing around an elderflower extract, Kujawski explains, “This is interesting to me because it has a slight honey character that could be useful for tea flavors. This is going to that secondary or tertiary character. It gives an interesting twist to products.”

Kujawski considers a fenugreek extract, “an old time botanical” he calls it. “It has a very maplelike character. It can be used for brown notes in baking type flavors, maybe a touch in a vanilla flavor at a very low level.”

Though linalool is a component of lavender oil, Kujawski notes its usefulness in apricot, peach and berry flavors. Pointing out its slight mustiness, he explains that “the acetate of this is actually very high in bergamot oil and is used in Earl Grey tea [flavors].”

In all cases, effecting realism with formula design is crucial. “When we talk about our fragrance colleagues, we say, ‘Everything they make is a fantasy.’ You get a fragrance brief and assume you’re on an island in the south Pacific and you’re watching the sun go down and the breeze is at your back and the trees are blossoming. [With flavors], the customers say, ‘We want something that’s like a tropical drink or a true lime.’ People have targets in mind that they’re comparing to.”