THE SECOND C:
An Interview with Chris Sargeant

By Keith Hoover

Those who came before us have set the stage for what we can do today.

In apparel color management, Chris Sargeant led the way at Marks & Spencer (M&S) in the 1990s by digitizing the entire color process. He not only adopted spectrophotometry and digital color approval (allowing self-approval at the dyehouse, thus eliminating the requirement for submitting lab dips), he also addressed the color and palette selection process used in design and drove the development of accurate digital on-screen color technology.

Sargeant sees color management as a system, not merely people working in different phases. He encouraged communication, dialogue, education, and documentation that improved efficiency at every level, thus driving value to M&S and its supply chain.

A LITTLE BACKGROUND

Sargeant received a degree in chemistry from Leeds University. His first job was with ICI Dyestuffs in Manchester, UK. At the time, ICI had made a significant R&D investment in automated recipe prediction. This technology was seen as a service to their customers. The faster dyers could get recipes, the more dye ICI would sell. In 1965, ICI completed the IMP scheme (Instrumental Match Prediction).

At about the same time, Davidson and Hemmendinger (D&H) in the US launched their first analog computer, COMIC (which stood for **CO**lorant **MI**xture **C**omputer) to drive recipe prediction. These two developments laid the groundwork for the approach to color management still in use today.

Later, Sargeant went to work for the acrylic fiber producer, Chemstrand, an offshoot of Monsanto, that was interested in ICI's work on automated recipe prediction. He was assigned to investigate it along with spectrophotometers.

Sargeant's research identified Kollmorgen's Color Eye "Big Boy" (with an 18-inch integrating sphere) as the ideal instrument and COMIC for recipe prediction as the right technology for Chemstrand to acquire.

Since the original COMIC was an analog computer, formulation was extremely time consuming and tedious (taking an entire day to generate one prediction). The technology worked and was accurate, but not yet scalable.

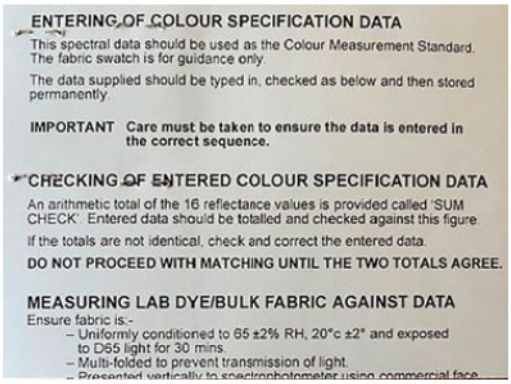
Although D&H later developed the COMIC II, a digital version of the original instrument, [1] it wasn't until the introduction of digital computers decades later that color management moved forward. However, speed came with a cost. Instruments were downgraded to afford the higher cost of digital computing.

This sets the stage for Sargeant's story. The following is Sargeant's journey, in his own words.

SARGEANT GOES TO M&S

"When I joined M&S in 1970, color instruments still weren't very accurate. And with color matching, you could get a reading, but you always got the immediate argument: 'Is the instrument right or is the human eye right?' At that particular time, it was quite clear that the instrument wasn't as good as the visual observer.

In the beginning of their new color program, M&S worked with a few partner mills to produce dyed fabric for color standards for the supply chain. Eventually, spectral data were added to supplement the color swatch. Note that the spectral data were captured at 20nm intervals instead of 10 nm intervals as is done today. Nevertheless, the digital definition of the color was more accurate and objective than the visual reference.



Finally, spectral data were specified as the real color standard and the fabric swatch was just a supplement. Note the detailed instructions provided for entering the spectral data into the system. This was before QTX files were used to directly import data into software.

"Not much happened until a lot later—and that was probably the mid to late '80s before the instruments and the computer bit came back to something near the Kollmorgen Color Eye standards of about 20 years previous. It was the Spectraflash range from Datacolor and the equivalent Macbeth instruments that began to be sort of half decent. And at that stage, yes, providing you did everything in a standard way, the machines beat the human eye every time.

"But you had to have the protocol set up because, you know, everything affects color, doesn't it? Humidity, temperature, pressure, all those kinds of things.

"So, together, my team (which included Janet Best who was instrumental in this) began the project. She's very good at writing out details on this sort of thing. We had to determine the protocols that you need to do to get consistent color measurement across the supply base.

"And where did we get the impetus for what we did or the model? Probably the last place you'd have thought of.

"It was McDonald's."

I'm Lovin' It

As it happened, I had two daughters, and both of them worked for McDonald's in their spare time. One of them was a shift manager, as she was studying for her degree.

"And I thought, this is very good, because what McDonald's do, is they write down everything you need to know to make a burger. And then they test the students and if they can do it properly, they give them an extra 10p a week. And if they don't, they go back for retraining. And they do it across the world.

"So, McDonald's burgers are just as bad in Hong Kong as they are in the UK or anywhere else. Oh, sorry. Just as *good*. They're consistent. And I thought, that's a good model. So that's what we developed. I sort of tried to do the thinking bit and Janet worked it out as to what we actually needed to do."

CONTROL

"What do you need to do to get consistent color measurement across a range of things? You need a computer, a standardized measuring instrument, and standard tiles for correlation, etc.

Telling the story: A key to Sargeant's success was presenting both the design and commercial benefits of digital color. Digital color management isn't just about lab dips—it provides a consistent color point of view, eliminates wasted time, and improves product quality.

Before there was 3D or Gen AI design tools, the ImageMaster color design visualization system touted accurate on-screen color. It was developed through a multi-party collaboration led by Sargeant.

"With those things in place, it doesn't matter whether I measure it here or somebody does it in Hong Kong, we'll get the same answer.

"It's because the machines are calibrated together. That's the key to it. That began to make it possible to set pass/fail tolerances on actual production."

THE PROBLEM TO BE SOLVED

"In my initial experience at M&S, the way of doing color matching was to get a dyer to do umpteen lab dyes to sort of try and get somewhere near the page you want and for them to go back and forth with the customer. The whole thing would take an age. And when you got there, it wasn't very good anyway.

"We were in a business where we were multi-sourcing huge volumes of basic items. For women's cotton T-shirts, we probably had 18 or 20 manufacturers making this stuff in volume. And what we wanted was consistency of color and appearance across the whole lot—as if they'd come out of one man's hands in production.

"It's just like making a burger. And it's exactly the same issue. We managed to get some measuring protocols and tolerances to get this into action."

ESTABLISHING THE STANDARD

"From the experience I'd remembered from earlier about the dye recipe prediction side of things, the dyers by that time could get a fair shot at a recipe for color with digital data.

"So that was the easy bit. Getting the standard established to do this was the more difficult bit because people had all sorts of ideas about how to interpret the standard. You'd give them a bit of fabric that was about 4" × 10" and they would sort of take it away and say, 'We're going to match that.'

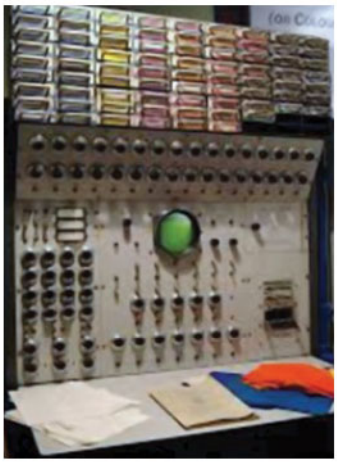
"And they got into production eventually, having submitted it back and forth umpteen times. And some of them would match the original standard. Some of them would match what they dyed last week. Others would do somewhere in between. And others—we didn't know what the hell they were doing. It was all over the place.

"And if you plotted the actual continuity on a big sheet, it was very much scattergun. Now, this was in the early days when we were dealing mainly with near-to-home UK manufacturing. And we had the luxury of two or three good dyers in the area around Nottingham, Leicester, and Derby. It was easy to visit them, keep an eye on them, and to learn.

"But it came to the point where we needed to go out a bit because of overseas manufacturing. We then had the issue of trying to convince people in Europe, Asia, and other parts of the world how to do this stuff. And that was quite a challenge."

Just Do It by the Numbers and See What Turns Out

"But we managed to do it. And the way I thought we should do it is this. We made color standards with a piece of fabric, but then we added digital data—16-point spectral data—on them as well, so we got both things.



The D&H COMIC. An analog computer for matching color (or performing Bach's "Toccata and Fugue in D Minor").

Sargeant and the Kollmorgen Big Boy

"And what I did in the Far East on one trip was I took spectral data only and I talked through what we were trying to do with these people in the dyehouse because, from the recipe predictions, most of them had the right equipment installed there already. So, they were off to a good start.

"I explained that they are only getting numbers. And I said, 'I want you to match these colors from these numbers and I'm going to come and collect your result tomorrow, but I'm not going to tell you what the color is. Just do it by the numbers and see what turns out.'

"And I did that with about a dozen or so people and went round and collected them again afterwards. And I pinned them all on a piece of card and, lo and behold, they all matched each other. And that's how we did it. And they were astonished, and, by God, I was astonished, I tell you.

"And, you know, I didn't think about it too much at the time, but I thought about it afterwards. All the people in these labs studied probably for seven or eight years if they went through the Society of Dyers and Colourists (SDC) color education process. And here's me telling them, 'Well, don't worry about that. Let's just do this.'

"One person did say to me, 'You're going to put these people out of work.' But not a single person was put out of work. It proved the point both to me and my colleagues that this stuff would work."

The Pivotal Moment

"We had a conference in Hong Kong with about 40 suppliers in quite a big location, and I'd been banging on about this instrumental stuff. Clement and Bill Lam of Fountainset were both there as I recapped what I'd been talking about.

"Shortly after that, Bill stood up and said, 'You know, I've been listening to young Sargeant here for quite a long time now talking about this instrumental color measurement. I was a little bit skeptical, shall we say, at first. But we've tried it, and we know it works. And I've got to say to you folks in this room, if you don't want to work this way, we'd rather not do business with you.' And then he sat down.

"And I thought, 'YES! We've got it!' And frankly, that was the progression that we went through."

BACK TO THE STANDARDS

"But there's another story as well that goes with all this. How do you decide in your company what colors you want in the first place? How do you set up the color palette for a season?

"Setting up colors was pretty chaotic because it involved designers and technical people working together. And you don't need a degree in chemistry for that. What you have to do is to be a mind reader and an interpreter. There was no understanding or comprehension whatsoever between the dyers and the designers.

"And this led to all sorts of problems. And it led to a massive bust up, actually, between the commercial management and the design department, because the designers couldn't or wouldn't make up their minds about what they wanted in the palette for a future season.

"They went all over the world looking for inspiration, but most of it came through things like the British Color Council and the International Color Council and those organizations because they all do the same colors at the end of the day.

"But to actually pin them down to exactly what they want was proving difficult. This affected the time scale and the delivery schedules and all the rest of it. We had a calendar that we needed to follow to get the colors sorted out in order to get the production on time and it wasn't working.

"You had overlapping seasons—this spring, next spring, the year after, and all that sort of stuff—and if you didn't meet some of these dates you weren't going to get the stuff right. And the commercial people got very touchy about all this."

The Challenge

"There needed to be a better system. I got called in one day and was told, 'Look we've got this big problem. The design development and the commercial people are up in arms with each other. Nobody seems to understand each other. Can you go and sort it out?' Well, it was a bit like a baptism by fire. But we did. I stressed to them the timing of this stuff. What I had to do was try and interpret in *my* head what they thought in *their* head—because they couldn't put it into words adequately."

Making Sense of Color Palettes

"A color palette for a season contains basic colors that don't change from season to season—and that's where the bulk of your production and sales go anyway.

"But you'll have "highlight colors" that change each year. And if, for example, it happens to be lilac, which is a pale purple type of shade, you're going to have a blue and a pink and a yellow and a green on that same line, aren't you? And you're going to have darker versions of it for things like skirts and trousers, lighter versions for blouses, and very pastel versions for lingerie and nightwear and stuff like that. And so, you could agree that, yeah, lilac's the key to all this, but then you've got to get the balance in all these other things. And that used to be by getting dyers out there to try and do this manually.

"In parallel with these other changes we were making, we had a good relationship with the University of Manchester Institute of Science and Technology (UMIST), and we set up a project with them to try and do accurate color on-screen—which they did. [2]. And then I could use that to simulate a line of pastel colors, for example, that we wanted.

"And if we've got a particular lilac, all you needed to do with the other colors is to tweak the Hue angle [h], leave everything else the same; leave the brightness [C*] and the depth [L*] the same. And you just go around from shade to shade until you get a nice-looking pile of colors—which you can do in five minutes on the machine. So that became useful and that's what has been incorporated into most CAD systems that the industry uses today.

"Using this visualization technology, you can actually see the color on the garment with all the texture and get a realistic look at it. One of the first companies to use it was Next in the UK. I had a student from Leeds University who went to work for them, and she came on attachment to me in M&S for a while, Then she went and set the system up in Next based on that experience.

"So, at Next, they could view colors for stuff from a vendor on-screen—garments that were actually in a warehouse in Hong Kong. This allowed them to look at it before it was sent, in other words. That worked very well.

"So, these things—these little things—all came together to make the system work."

A DESIGNER'S MINDSET

"You've got to sort of think like a designer in some instances. A typical example is if you've got a color for a top, you can get a nice bright version of that color on polyester or on cotton, but you can't get it on wool. You need to do a sympathetically tonal version on wool, which is essentially duller in terms, but it still looks nice. That's the interpretation. It's more a matter of communication.

"There's a bit of pure salesmanship in this as well, because if I couldn't get exactly what the designers thought they'd specified, I would get something that was sort of what they wanted along with another sample that was not very good. I'd show them the bad one first, and say, 'You really don't want this, and I've had a big argument with the dyer and he came up with this other one.' Then, they'd say 'Oh, why didn't you show me that in the first place—it's perfect.' It's a bit of salesmanship."

Getting Ahead of the Game

"One of the colors that came up as fashionable for a season involved a particular blue. It was C.I. Blue 41 (which was a bit like royal blue) and it was suddenly popular. And the problem was it hadn't been a popular color before, therefore dyestuff stocks around the industry were limited.

"We had a great big problem that you couldn't get enough of the dyestuff because it takes a lot longer to get replenished dyestuff stocks than it does anything else.

"It could take up to 18 months. This led us to think that what we really ought to do is to get an early warning of color trends to allow for this eventuality. So, we started to cultivate contacts with the dyestuff companies and their forward-looking people. The dyestuff companies began to employ designers for this very purpose as well, and that proved very useful. Then we went a step further. Having provided the dyestuff companies with a bit of foresight, why don't we call together a group of the main dyers we use and show them, as well? That way, they can be a bit prepared about what's happening.

"At first, the dyers came in and were a bit secretive about what they do. They didn't want to give too much away, so in the first meeting or two, they didn't say very much. They sort of sucked in all the information they could, but they didn't give much back.

"Then on one occasion, we were a bit late in calling these meetings, and I got a call from one of these dyers to ask if we would be having another meeting. He needed to be able to discuss what we're going to do. If we didn't have the meetings, they got very sloppy—which was actually quite a compliment to the impact of the meetings.

"The most useful time in those meetings was actually the lunch we gave them afterwards. That's when they talked to us and they talked to each other in a more relaxed fashion. We had a big seventh floor restaurant in Baker Street for that sort of thing.

"So that proved extremely useful. We had a lot less trouble getting what we wanted once they had more thought and time to sort it out for themselves. We extended this around the world as well with the agents of the Far East.

IN SUMMARY, BUH-DIP BUP BUP BUHHH

"If you want to do it right, go back to the McDonald's system. We don't need to supervise mills. They can self-regulate and make their own decisions. Rather than submitting everything to the customer, they can do it properly. They've demonstrated that.

"And this was the key thing that Bill Lam picked up on when he said, 'Look, we used to have huge delays where production was stopped because we weren't sure whether this was acceptable or that was acceptable.'

"Since I retired in 2000, it has been gratifying to see that the basic technology we built on supports many more sophisticated applications, extending the benefits of digital color management to automotive, food and beverage, paints, cosmetics, printing, wallpaper, and other industries. In textiles, I am pleased that from my UK perspective, the emphasis has moved away from endless lab dyes and submissions to improving process control and 'Right First Time' production—with huge benefits in saving water, reducing costs, and helping the environment. My colleagues and I were privileged to be involved at an early stage."

Sargeant in 2025 during the interview.

THIRTY YEARS LATER

It was great to have this discussion with Sargeant. Think of it. Thirty years ago, M&S had digital on-screen color (using CRT monitors), reflectance data for color standards (that had to be keyed into DOS software)—***and dyehouse self-approval with no lab dip submissions***. Sargeant developed the right color management process that guaranteed the highest color quality using the best available technology.

The process he defined is still valid and the technology has grown exponentially. Today, we have high-speed internet access, high-res OLED monitors, 3D design software, generative AI design apps, tablets, smartphones, email and countless communication apps, reliable spectrophotometers, color matching and QC software (and freeware), several certified color standard providers…

…And still, we lab dip. Like it's 1985.

When I was at Target in 2000 planning a digital process, I wrote Sargeant an email asking for his advice. He told

me, "The important thing is to get started—even if it only involves half the business. However much you can do digitally is an improvement over the old process and allows you the time to tackle other problems. Just get started and stay with it."

Sargeant paved the way for digital color management and inspired many who came after him. We have the chance to continue his innovations, to improve many lives around the world, as well as the bottom lines of our companies.

Do what Chris did.

Notes

[1] Kollmorgen bought D&H in 1967 and integrated it into their Macbeth Instrument Development Laboratories. Macbeth became GretagMacbeth, which was eventually acquired by X-Rite.

[2] This technology led to ImageMaster (now Envision) by Datacolor and DigiEye by Verivide.

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Vindon Ltd.—Conditioning cabinets
National Physical Laboratory— Spectro calibration tiles
Society of Dyers and Colourists—Meetings and Student Design Competition
Chris Sargeant, B.Sc, C Col, FSDC

Keith Hoover, President of Black Swan Textiles, implements manufacturing-centric digital processes for color and fabric development. He has implemented digital color management programs for Ralph Lauren, Target, Lands' End, JCPenney, and Under Armour, ultimately leading to a process that eliminated lab dips altogether. At Under Armour, Hoover championed the UA Lighthouse, driving digitalization and advanced manufacturing processes to explore local-for-local sourcing. He has worked hands-on in mills worldwide and is a frequent AATCC presenter.

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