

# A Career Working With Jim Wyant

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## ABSTRACT

Upon entering graduate school, I wanted to ensure real world experience prior to graduation. Fortunately, Jim Wyant was willing to accept me as a student, working with him at Wyko Corporation. After graduating I stayed on as an optical engineer, product manager, and eventually engineering and research director as the company was acquired by Veeco and eventually Bruker. Meanwhile Jim Wyant had brought another optics company to Tucson, 4D Technology, with unique technology developed by James Millerd and Neal Brock. That organization was growing well, with many former Wyko/Veeco employees, and as Bruker's Tucson business changed, I moved to help grow it further, staying in the Wyant ecosystem. This talk will focus on my journey under Jim's companies, including key milestones and stories from my own experience and those of some of the other long-term employees of Wyant's optical enterprises..

**Keywords:** Jim Wyant, Interferometry

## 1. GRADUATE SCHOOL AND WYKO

I first started my optics career by receiving my undergraduate degree from the University of Arizona in Optical Engineering in May of 1993. I decided to continue on to graduate studies due to: funding for at least my first year, a desire to avoid entering the real world for at least several more years, and of course, last and likely least – the pursuit of knowledge. However, I had a deep fear that after all those years in school, I might find myself unemployable on graduation, so wanted an actual job rather than just to work in a lab during my graduate studies. Also, it seemed like a great way to actually get paid for hours worked, unlike the other students that I heard got paid flat rates and worked long hours. So my plan was set.

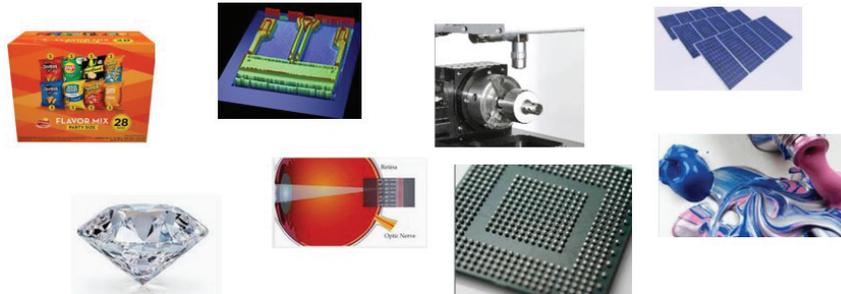
When I asked around Mike Nofziger, the undergraduate laboratory coordinator and then my closest contact in optics, recommended I go speak to Jim Wyant at Wyko. First, he said they did really great work over there. And he also told me that since I had a grant to fund my first year, I'd likely get a warm reception because 'Jim really likes free!' I called up, arranged an interview, and then was pretty astounded when the first words I heard from Jim on entering his office was 'Oh, I hoped you'd be taller.' I must have expressed my shock on my face, because Jim went on to explain that they participated in the corporate Olympics every year but were very weak at the basketball event, and he had hoped I'd help that out. At 5'9", I informed him that I was unlikely to do so, but hoped I could contribute in other ways.



**Figure 1: Wyko Corporation Entrance**

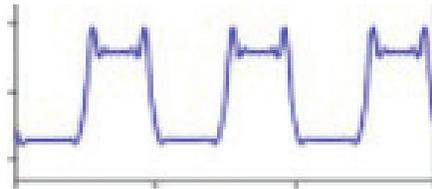
During the interview we also talked about possible research areas and what to expect. I remember Jim telling me that the purpose of PhD research was NOT to win a Nobel prize, but rather to try to achieve a degree as quickly and painlessly as possible. That too was a refreshing take on the normal treatment of grad students, who sometimes struggled for years to get their desired outcomes. He also explained to me how metrology would offer a wide range of

problems to pursue as well as great exposure to many technologies. ‘You can’t reliably produce something if you can’t measure it’ We talked about applications in semiconductor, data storage, materials, paints, physiology and more. He also explained why on the building tour there were dozens of cases of potato chips in the break room. I first thought maybe the stereotypes of nerds/high-tech workers loving junk food were true. But Jim explained that they recently had used the Wyko 3D microscopes to find micro-pinholes in the packaging of chips for Frito Lay, related to a vendor problem of theirs, that was causing chips to go stale prematurely; in gratitude they sent a ton of chips to the site. By the end of the visit, we both were excited I think to have me join the team.



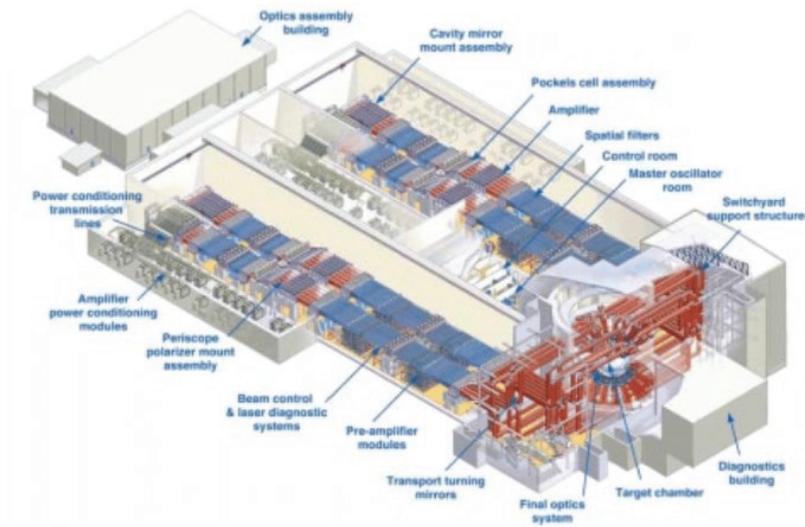
**Figure 2: Some key applications of Wyko’s products including food packaging, data storage, automotive, solar, materials characterization (even gemstones), eye, semiconductor, and paint metrology.**

My first attempt at a PhD project involved the notorious ‘bat wing’ effect, where sharp edges measured with coherence scanning interferometry would have overshoots/undershoots in the measured result at the transitions. Jim told me it was something they had struggled with for years and would be lots of fun. Unfortunately, after 2 years where I took tens of thousands of measurements and created numerous models of behavior, I was no closer to eliminating the effect, though I understood well what could make it better or worse.



**Figure 3: 2D trace of the batwing effect when measuring a periodic grating.**

Fortunately, Wyko had another urgent need, and my dissertation topic became performance optimization of the 24” interferometers being produced to characterize the meter-scale optics for Lawrence Livermore’s National Ignition Facility. During this time Jim helped me navigate both the research aspects of the topic as well as the various highly intelligent and often opinionated personalities working on the program. He also encouraged me to ‘just write it up’ when one of the optics vendors caused an 18-month delay in the program because they mistakenly had been removing power in their interferometer software from results of a large fold mirror they were polishing. Unfortunately, I was too stubborn to listen and basically just delayed my hiring into a full-time, and more highly paid, position for no good reason except that I wanted to see first light in the interferometer before I was done.



**Figure 4: Drawing of the National Ignition Facility, with more than 8000 meter-class optics.**

## 2. VEECO AND BRUKER

The delay in receiving my PhD added some additional drama to my decision on where to work upon graduation. While I had several offers, I ultimately preferred to stay in Tucson. However, Veeco Instruments had acquired Wyko in the middle of 1997, and my graduation was pushed to 1998. I simply didn't know the new senior management very well. Fortunately, Jim advocated hard for them to keep me, and ultimately I accepted a position at Veeco Tucson. There was a bit of added drama though as in the first conversation I had with my new boss, the engineering director, I was told 'I was told I had to hire you, so you had better be worth it!'. I guess since I had that position just a few years later I must not have been too poor an investment. While Jim was no longer involved in the day-to-day business, we continued to collaborate on research projects with his graduate students and he remained an advocate for the employees to the senior management of Veeco, which literally referred to personnel as 'cost centers' and at one point when asked how many employees the company would have after a merger answered, 'too many!' However, the strong family atmosphere started by Jim and the early employees remained for many years.

After Veeco's metrology division was in turn sold to Bruker, the corporate atmosphere continued to deteriorate, with emphasis on 'milking products' for cash rather than innovation. The organization became siloed, with different goals between groups leading to a lack of cooperation. Even morale-building events were curtailed, with restaurant-based holiday parties or company picnics giving way to anemic pot-luck lunches. Fortunately, while this was occurring, Jim had been working to grow another optics company that he had brought to Tucson: 4D Technology.

## 3. 4D TECHNOLOGY

James Millerd and Neal Brock founded 4D Technology in 2000 as a spinoff from MetroLaser with the first dynamic interferometry products. Despite some early success, by 2002 expenses were outweighing revenues and the financial situation was looking tight. However, after long discussions with the mirror lab at the University of Arizona on how they might be able to purchase an instrument, Marty Valente finally called that he'd like to come look at the system, and was bringing Jim Wyant and John Hayes along as well. The demo and facility tour went well, and then walking to lunch Jim turned to James and asked 'So how much?' James replied that the PhaseCam product cost about \$85K. Jim gently clarified: 'No not for the instrument. For the whole company.' Jim's eye for strong technology and good people therefore led to yet another optics venture being based in Tucson.



**Figure 5: Jim Wyant, James Millerd, and Neal Brock in front of the 4D Technology offices.**

When 4D Technology opened up in Tucson in 2002, I was quite intrigued. I thought that taking 3D data in a single camera frame at high-resolution could be a real game changer, especially in high-volume production operations. However, it would take me roughly 10 years before I became wise enough to move from Bruker to 4D. I came onboard as the business development director, with the goal of moving 4D's products from almost solely measuring optical components to arenas such as semiconductor, precision machining, aerospace and more. I was impressed with the entire team, and my moves to new directions were embraced and supported. Early on I joked with Jim that he just couldn't get rid of me, to which he replied that he was glad of that fact.



**Figure 6: Left to right: Neal Brock, Shawn McDermed, Jim Wyant, James Millerd, Joanna Schmit, Mike Zeechino, Michael North-Morris, Tim Horner and Erik Novak receiving a Prism award from SPIE for the FlexCam production-focused product.**

I've now been with 4D for over 8 years, and recently was given the opportunity to become general manager of the business. While now part of Onto Innovation, the core strengths of innovation, friendliness, customer-focus, and cooperation remain strong and the rest of the corporation is extremely positive and supportive of what we are doing. I remain grateful that Jim didn't let my lack of basketball skills derail our first meeting and that he's supported me and these great companies so stridently over the years. I hope to keep having fun and providing innovative solutions to our customers based on the lessons I learned from Jim.