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Transcript of Steven J. Dietl

Date: December 21, 2023
Case: Canon U.S.A., Inc., et al. -v- Slingshot Printing, Inc. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CANON U.S.A., INC. and CANON INC.,
Petitioners,
vs.
SLINGSHOT PRINTING, INC.,
Patent Owner.

Case Nos. IPR2022-00312 & IPR2023-00313

DEPOSITION OF STEVEN J. DIETL
Conducted Virtually
Thursday, December 21, 2023
9:09 A.M.

Job No.: 517962
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Deposition of STEVEN J. DIETL, conducted virtually.

Pursuant to notice, before CRYSTAL HEREFORD, Registered Professional Reporter, Certificate No. 30819; California Certified Reporter, Certificate No. 14416; and Arizona Certified Shorthand Reporter, Certificate No. 50893.

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A P P E A R A N C E S

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E X H I B I T S

(Attached to the transcript)

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PROCEEDINGS

THE REPORTER: We will go on the record.

Will counsel please announce your appearance and state whom you represent, beginning with the taking attorney.

MR. FORGHANY: Ehsun Forghany, Morgan, Lewis & Bockius, representing Petitioners Canon.

MR. BORSOS: Mark Borsos from Fitch, Even, Tabin & Flannery, representing Slingshot Printing.

STEVEN DIETL,

a witness herein, having been first duly sworn by the certified reporter to speak the truth and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MR. FORGHANY:

Q. Good morning, Mr. Dietl. My name is Ehsun Forghany. I represent the Petitioners Canon in the subject IPRs.

And I understand you're here to give testimony on behalf of Slingshot for IPR2023-313, which is for the '708 patent, and for the '823 patent. That's the 314. Is that correct?

A. That is correct.

Q. And the testimony that you're going to be giving today, it can be applied to both of those IPRs,

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correct?

A. Yes.

Q. And before we begin -- I know that you were just freshly deposed in the other IPR, but just for the purposes of completeness, are you on any medication today that would prevent you from testifying truthfully or accurately?

A. I am not.

Q. And do you understand that the testimony you give under oath today is going to be subject to the same penalties of perjury as though you were testifying in a court of law?

A. I do.

Q. And do you understand that until this deposition is over you cannot discuss your testimony with Slingshot's counsel?

A. Yes, I understand.

Q. And for purposes of you and I, I'm going to assume that you understand the questions I ask you unless you tell me that you didn't understand. And if I ask a question that's unclear or I speak too quickly, just please ask me to clarify. I'll try to slow down and explain a different way. Does that sound fair?

A. Yes. That sounds fair. I'll try.

Q. And so on top of that, please just allow me

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to try to finish my question before you respond. It would be a nightmare for the court reporter if we talk over each other.

And, again, try to answer my questions orally rather than shaking your head or with gestures.

And with that, you know, is there any reason you believe you cannot fully and accurately answer any of my questions today?

A. No, no reason.

Q. Perfect.

So we can start from the top. What did you do to prepare for today's deposition?

A. I read through the IPRs from Canon to the court. I read through the reference materials, the patents involved in both the -- the Slingshot patents and the references cited by Canon's attorneys and Dr. Pond. I met with counsel yesterday. We talked about the case in preparation, went through the references, and -- my declaration and those reference materials.

Q. And was yesterday the first time you met with counsel about your deposition today?

A. Yes. About the deposition today, that's correct.

Q. And how long did you spend during that

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meeting with counsel?

A. Probably about six hours, three hours on each patent.

Q. And other than the documents that have been filed or -- on the record in the IPRs or the ones that were referenced in Dr. Pond's deposition, were there any materials that you reviewed in preparation for this deposition other than those I just mentioned?

A. No, no other documents.

Q. Other than counsel for Slingshot present today, did you meet with any other attorneys --

A. No.

Q. -- who represent Slingshot in this matter?

A. No, no other attorneys.

Q. Have you met with anyone at Slingshot?

A. No.

Q. And what was your rate in this case to prepare your opinions in this case?

A. $230 per hour.

Q. Was that contingent on the outcome of the case?

A. No. It's irrelevant to the outcome of the case.

Q. And that was the same rate that you applied yesterday?

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A. Yes.
Q. And are there any other people that work for you or are part of your team that helped prepare your opinions in this matter?
A. No.
Q. How long would you say you've spent preparing your opinions in this matter for both IPRs?
A. Including the declarations?
Q. Yes.
A. Yeah. It was a substantial amount of time. It was, you know, probably 30, 40 hours.
Q. 30, 40 hours on the declarations?
A. Yes, and in preparation of this -- for this deposition, in total.
Q. So about 34 hours declaration, 6 hours prepping for this deposition?
MR. BORSOS: Objection.
A. I think the 6 hours --
Q. You can go ahead, Mr. Dietl.
A. I think the 6 hours are part of that 30 hours. I'd have to go back and look. I don't have it right in front of me, the amount of time I spent.
Q. And did you make any assumptions in connection with your opinions?
A. Assumptions --

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MR. BORSOS: Objection to form.
A. I don't understand the question. Can you be more specific?
Q. Yeah. When you rendered your opinions in this matter, did you rely on any assumptions that were provided to you by counsel?
A. No. I didn't rely on any assumptions.
Q. Did counsel instruct you to make any assumptions in this case?
A. Counsel instructed me on some aspects of the law regarding definitions of obviousness and anticipation and what -- some of the rules of evidence and things like that. Those are all things that counsel advised me on.
Q. Very thrilling conversation, I'm sure.
A. Yes, wonderful.
Q. And is this -- so was it the first time you were learning about those concepts? Or have you opined on it in a patent case before this one?
A. Before this -- these particular two patents, yes.
Q. How about any other cases besides the ones that are involving Slingshot?
A. So quite a long time ago, I was a 30(b)(6) witness for Xerox Corporation in a patent lawsuit. And

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that was quite a long time ago. I don't remember a lot of details around what was advised at the time.
Q. And so you were not providing an expert opinion in that matter, then, correct?
A. I was not. I --
MR. BORSOS: Objection to form.
Q. Do you recall the topic of the -- that you were designated to testify about?
A. It was a patent infringement case that Hewlett-Packard asserted against Xerox Corporation. I don't remember the number of the patent. The primary inventor was Baker.
Q. Do you recall the technology?
A. It was related to the inkjet cartridge ink supply technology.
Q. And your testimony concerned the products that HP had accused of infringement?
A. That was part of it. Again, it was a long time ago, so I don't remember a lot of the details.
Q. But you weren't opining on the scope of the claims or anything like that, correct?
A. I don't believe so. I don't believe I was opining on those.
Q. So you prepared a declaration for the -- what I'm going to refer to just for shorthand purposes today

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as the '708 IPR. And that has been referenced to, you know, IPR2023-313 for the '708 patent.
MR. FORGHANY: Can we go ahead and mark -- it should be titled "Dietl Exhibit 1."
THE TECHNICIAN: Okay. Counsel, it's still not in the repository. I'd be happy to download them and show them to the witness from chat.
MR. FORGHANY: Yep.
(Exhibit Number 1 introduced.)
Q. Mr. Dietl, please take a moment to just -- you know, you can request control of the mouse -- or of the document. And go ahead and just scroll through this document, and just make sure it's the -- you recognize it.
A. I mean, I recognize this document. Sure.
Q. And what is this document?
A. This is my declaration regarding the IPR on the '708 -- regarding the '708 patent.
Q. And is that your signature at the end of the document?
A. Yes, it is.
Q. You mentioned that the last time you reviewed this document was yesterday?
A. Yes.
Q. And are you aware of any errors in this

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declaration?
A. Not -- other than typos or something, no, I'm not aware of any errors.
Q. Is there anything you want to change in this declaration?
A. No, not that I know of.
Q. And how much time did you spend preparing this declaration specifically?
A. 10 to 15 hours.
Q. And I'm sorry. I didn't catch the last part of it -- your statement.
A. I said 10 to 15 hours.
Q. And when did you begin working on your declaration?
A. I don't recall the dates.
Q. Approximately -- was it --
A. It was in the -- it was in --
Q. -- before or after October 1?
MR. BORSOS: Objection; relevance.
THE REPORTER: And, Counsel, for the court reporter, could you repeat your question. I did not get it all.
Q. Was it before or after October 1 that you started working on your expert declaration?
A. I'd have to go back and take a look at my

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records.
Q. What records would you need to review?
A. A calendar.
Q. If you could pull it up quickly, feel free to do so.
MR. BORSOS: Objection.
Counsel, can you let me know the relevance of this line of questioning?
MR. FORGHANY: Sure. Why don't we just go off the record briefly.
THE REPORTER: We're off the record.
(Off the record: 9:24 a.m. to 9:26 a.m.)
MR. FORGHANY: Let's go back on the record.
THE REPORTER: Okay. We're back on the record.
Q. So, Mr. Dietl --
A. Can we pause a moment. I'm having a technology problem.
Okay. I'm back.
Q. Did you begin drafting your declaration before or after Dr. Pond's deposition in this IPR?
A. It was after Dr. Pond's deposition.
Q. And the same thing for the declaration in the '823 IPR?
A. Yes.

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Q. Now, for the sake of convenience and to move things along, I'm going to be referring to the papers and exhibits that were filed in the '708 IPR unless I state otherwise. Does that sound fair?
A. Okay. Yes. That sounds fair.
Q. So can you turn to the "Materials Considered" section of your declaration, which starts on page 5.
Let me know when you're there and you've read through it.
A. The list of exhibits?
Q. Yeah, materials considered.
A. I'm not quite sure...
Q. It starts on page 5, paragraph 18.
Let me know when you've had a chance to review.
A. I apologize. I was looking at the wrong document.
Okay. Page 5, yes.
Q. And do you recognize this as part of your report?
A. Yes. I do recognize this as part of my work.
Q. And are all the written materials that you considered in rendering your opinions listed in this "Materials Considered" section of your declaration?
A. To the best of my knowledge, yes.

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Q. Have you reviewed any additional materials since providing your expert declaration or -- that aren't listed here?
A. I looked at the patent by S. Glend (phonetic) that was referenced as part of the case history, but the -- about this Barkley '708 patent.
Q. When you says cases, you're referring to the --
A. File --
Q. -- '823 and the '708 patent?
A. Correct, the file history of '708.
Q. And did your review of that document change your opinions at all from what you had presented in this -- in your declaration?
A. No.
Q. Do you plan on considering any other written materials prior -- in this case other than what you've listed here --
A. No.
Q. -- sitting here today?
A. Not that I know of.
Q. Now, I'd like to go ahead and mark as Exhibit 2 your CV.
THE TECHNICIAN. I can, Counsel, if you could just drop that in the chat, pull it up.

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MR. FORGHANY: It's already in the chat.
(Exhibit Number 2 introduced.)
Q. So do you recognize this document, Mr. Dietl?
A. Yes, I do.
Is it possible to make it larger?
Q. And feel free -- you can actually download the document from the chat yourself if you wanted to control it and zoom in on different areas.
MR. BORSOS: Just for the record, I do not see documents in the chat, but obviously they're going to Michelle.
MR. FORGHANY: I'll just send it to everybody.
MR. BORSOS: Thank you.
Q. Have you had a chance to review the document, Mr. Dietl?
A. Yes, I have.
Q. Is this the -- what's been marked as Exhibit Number 2 an accurate and updated version of your CV?
A. Yes, it is.
Q. And so I want to get a better understanding of your background and what kind of led you to get into the printer field. And it's tied to a statement that you have made in your declaration under "a person of ordinary skill in the art," and you mentioned that you

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had experience in this field, and I want to get a better understanding of that experience.
So if you could start maybe explaining, you know, what, if any, background you had in inkjet printers before joining Xerox.
A. I had no experience in inkjet printers before joining Xerox. I was a student.
Q. And what did you study specifically in school?
A. Before joining Xerox, I studied engineering science and mechanical engineering, my bachelor's of science in mechanical engineering, at the state University of New York at Buffalo. And then subsequent to joining Xerox, I continued my education and earned my master's of systems engineering from the Rochester Institute of Technology.
Q. And did any of that coursework involve or specialize in thermal heat management or anything of that nature?
A. Definitely. Yes. Heat transfer, thermodynamics are key parts to a mechanical engineering degree.
Q. In an inkjet application?
A. Well, by transferable skills of how to apply that knowledge to inkjets, sure. But no. The broad

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education doesn't hone in on specific applications typically.
Q. I just was more interested here, you know, if you worked on any specific projects that would involve that or if you had a thesis that you wrote involving this subject matter.
A. I did not.
Q. And then from there, you were a design engineer, it looks like, at South Korea?
A. Well, the -- so before South Korea, I was a design engineer -- right? -- at Xerox, starting from 1981 to 1995. I started out working on laser printers for a -- pagewide laser printers and then moved into an advanced technology development engineer role where we evaluated various technologies for marking that included inkjet as one of those technologies.
And as a part of that team, the company decided that they would take further investment in commercializing inkjet, and so that's where I became more focused on inkjet. Product design, I was a product design engineer and subsystem team leader designing printheads, ink cartridges, maintenance station systems in the -- as a product design engineer.
Q. And that answered the clarification I was seeking. In your CV, under the Xerox on page 3, all of

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those titles are essentially for Xerox. They're not separate entities that you were working for in those roles.
A. That's correct. They're all as an engineer at Xerox Corporation.
Q. So after you graduated in 1981, you joined Xerox. And I understand you joined a group that was managed by Philip Harrison. Is that correct?
A. That's interesting. Yes. That's -- that was the advanced technology development team. Yeah.
Q. And that was a team where you were looking for, you know, print technologies other than Xerox's core xerography for use in their printers and plotters and copiers and everything, correct?
THE REPORTER: I'm sorry. Can you repeat the question for the court reporter a little slower.
Q. I'll rephrase the question.
What was the advanced development group that Harrison was leading? What was its focus?
A. So Xerox Corporation, as you may be aware, is a company that was based on some technology developed and invented by Chester Carlson which he called xerography, and thus the name Xerox came out of that name. It has to do with electrostatic -- applying a pattern of electrostatic forces onto a photoreceptor

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drum and then getting toner, which is a dry ink particle, to attach to the drum in the pattern that you desire and then transfer from that drum that image onto a sheet of paper and then fuse the dry ink into the paper to make the image.

Xerox was seeing other activity in the world, and they were -- the company was interested in knowing whether there were technologies that might take away some of their market force. They were dominant in that field -- in that technology at the time. They wanted to make sure that they stayed dominant in the printing world, and if new technologies were to emerge, they wanted to make sure that they were aware of those.

So our job in the advanced technology group was to evaluate these alternate technologies and make a recommendation to the company on areas where it would be better to make additional investment or areas where it wouldn't be as wise to make additional investment.

Q. And as part of that group, your job was also to take technology that was developed by other groups at Xerox and basically engineer early prototypes for demonstrations to senior management, correct?

A. That was part of the group responsibility. Yes.

Q. And one of the groups that you worked with

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was a Xerox corporate research group.

A. Correct.

Q. And that was a group that Dr. Pond managed at the time, correct?

A. Yeah. He managed an inkjet subdivision of the corporate research group. I'm not sure if he was in charge of the entire corporate research, but he might have been. I don't recall.

Q. And that was -- that research group, they were developing technology for Xerox that included continuous inkjet printheads and thermal printing printheads and thermal inkjet printheads, correct?

A. Can I make a point of order? I see that my counsel has disappeared from the meeting.

THE WITNESS: And you're muted, Mark, so...

MR. BORSOS: Sorry. I am muted.

I haven't said anything lately. I just had to go off camera for a second, but I am still present.

THE WITNESS: Okay.

A. I'm sorry. Mr. Forghany, could you ask the question again?

Q. Sure. The group that Dr. Pond was managing, Xerox's corporate research group, that group was responsible for developing technology -- non-xerographic technology for Xerox, including thermal printing

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printheads and thermal inkjet printheads, correct?

A. I think that was part of their responsibility. Yes. But I think if you wanted to get more details of the things they were working on, it would be better to talk to Dr. Pond. I'm sure they had other things they were working on also.

Q. And Dr. Pond's group, they had access to a semiconductor process fabrication laboratory where they would make silicon and other semiconductor devices for these early prototype testing, correct?

A. Yes. I think -- and I think it was limited to mostly the MEMS-related processes. They might have had some metal process. But they couldn't do logic, and I don't believe they could do CMOS or NMOS. But, you know, again, Dr. Pond would be better to --

Q. Right. And --

A. -- question.

Q. But you -- at least, you know, Harrison's group -- the advanced development group, that group would attend technology demonstrations that would be hosted by Dr. Pond and his research team, correct?

A. I don't recall. We collaborated on product design and development with that group. Whether there were presentations on technology, I don't recall.

Q. So Dr. Pond's group never, you know, provided

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you with a demonstration printhead that, you know, your group would then incorporate into printers and copiers they were trying to assemble?

A. They did provide a prototype printhead --

Q. The thermal inkjet printhead.

A. Thermal inkjet printhead, yeah. Yeah --

Q. And they're the ones that had developed it, correct?

A. Yes. Yes.

Q. And what was your role once it was supplied to you?

A. So I didn't have direct responsibility initially in this area, but one of our other engineers worked with them to integrate that prototype printhead into a demonstration model so that we could demonstrate inkjet printing for management --

Q. And --

A. -- and to evaluate the technology.

Q. Your role during that time -- you reported to John Stevens during that time period, correct?

A. No. What we're talking about is when we're still reporting to Philip Harrison where we made the demonstration fixture for --

Q. I see.

A. -- for the printhead that was provided by

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Dr. Pond's group.
Q. So during this time period, what was your role -- what did you work on with -- the thermal inkjet printhead that was developed by Dr. Pond's group, what was your contribution to that project?
A. So we just jumped -- I'm just -- jumping around a little bit because of the timeline, right?
There was the advanced development team, and they had this initial, very small prototype printhead that they provided. And that group worked to integrate it into a demonstration fixture.
Subsequent to that, we decided to commercialize the technology, and then we worked with Dr. Pond's group to design an inkjet printhead that would be suitable for product requirements for a low-cost, multifunction printer -- "multifunction" meaning printer, copier, fax, scanner integrated into one unit -- and we collaborated with them to develop that printhead. They focused on the printhead silicon aspect of it, and then we worked back and forth to design a printhead around that, which is the, you know, part that connects to that inkjet printhead, and then it was inserted into the printer itself to make connection with the printer.
Q. Sure. And you mentioned there's -- you

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bifurcated this experience, and I didn't mean to suggest that they were one and the same. But you mentioned that, you know, there was an initial period where Dr. Pond's group -- you know, the Xerox corporate research group provided you with a thermal inkjet printhead they had developed.
A. Correct.
Q. And then at another later point there was a decision to commercialize that printhead. Is that fair?
A. Correct. Yes.
Q. What was your -- what contributions did you make to the thermal inkjet printhead itself prior to the decision to commercialize it?
A. So the thermal inkjet printhead, the assembly has the ink supply, the interface to the printer, all the mounting hardware that you would need to physically locate the silicon die part of the inkjet printhead.
And I was responsible for all the printhead support design, and then I worked with them, with their team of engineers and -- to opt -- to select the design features around that printhead silicon die that would meet the product requirements that would integrate well into a printhead design that we could then put into a printer design. So it was a collaborative -- it was a collaborative effort. I worked with --

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Q. Isn't it true that you worked -- I'm sorry. Go ahead.
A. You know, they had CMOS -- they had CMOS design or NMOS design engineers that worked on the project. They also had some packaging technology people that were very helpful. They had -- there were physicists that worked on the drop ejection -- right? -- and firing chamber and how to optimize that. There was color modeling people on both sides, between the engineering team and the research team. So it was a collaborative -- collaborative effort at the time.
Q. Did you contribute to the decision about which resistors to use on the printhead?
A. I --
MR. BORSOS: Objection to form.
A. I collaborated on the -- evaluating the options, and then when we made test samples, either through what they could do in their lab or we had external silicon partners that we worked with, to evaluate those options and to make decisions together on the right materials, the right heater design, the right drop ejector design.
Q. Isn't it true that your responsibilities were limited to -- on the inkjet -- thermal inkjet printhead that Dr. Pond's group developed, your responsibility was

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limited to working on the printhead carrier and maintenance station?
MR. BORSOS: Objection to form.
A. No. That's not true.
Q. Did you work on the ink -- the printhead carrier for the thermal inkjet printhead that Dr. Pond developed?
A. So you're -- I'm not sure what a printhead carrier is. We worked on the cartridge.
Q. What about the maintenance station?
A. I worked on the maintenance station. I worked on the ink supply that was part of the cartridge. And we worked on the integration of the silicon die into the printhead.
We also worked on the specification of that silicon die, because not only did it have to be something that -- it's not something that Dr. Pond developed and just handed -- his group just handed it over a wall and said "Here, integrate this." It was a collaboratively effort to decide all the features that we would put on that product collaboratively.
Q. And that product was code named Steelhead, correct?
A. I don't -- I don't recall.
Q. And do you recall that your group had made a

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unique printer that moved Dr. Pond's printhead over a sheet of paper held on a flatbed support in an X-Y skating motion?

MR. BORSOS: Objection to form.

A. That's correct. That was what -- it was a precursor to a commercialized product, and it was -- I think the program name was called AMPS, but I don't know that -- now we're getting into things that probably were proprietary knowledge.

Q. Which is --

A. Code names of products, I probably shouldn't say for -- yeah.

Q. During the 1981 to '87 time frame, were you aware of anybody else at Xerox -- any other group that was a source of thermal inkjet devices other than Dr. Pond's group?

A. I'm not sure. There was -- there were some people in a small research group in Toronto that was working on -- technology. There was another small research group in Texas -- I forget exactly where in Texas -- that were part of the daisy wheel printing -- printer group. They were doing some technology work. But that was a long time ago. I can't remember any details about that.

Q. And would it be fair to say that during that

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same time period, you know, when you were active in Harrison's group, that group was -- you know, Harrison's group was chiefly, you know, developing ink container concepts and printhead maintenance procedures and hardware? Is that a fair characterization?

MR. BORSOS: Objection to form.

A. So I don't think Mr. Harrison was involved for very long, so I -- you asked that question. He was more involved in the advanced technology development group. And as it went to commercialized technology, I believe Dr. Pond was in charge of the project, and we all then reported up through him at that time with -- you know, with other levels of management in between, but...

Q. And I can reframe my question. I'll just -- is it fair to say that the advanced development group that you were a part of, that it was chiefly developing ink container concepts and printhead maintenance procedures and hardware and not focused on thermal inkjet printheads?

A. That's not true.

MR. BORSOS: Objection to form.

Q. What part of that is not true?

A. We were focused on the -- all the aspects of commercializing thermal inkjet technology into a

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printer, into a product.

Q. I think we're misunderstanding the question.

So was -- were you solely -- were you only working -- was the advanced development group's sole purpose to support Dr. Pond's research?

MR. BORSOS: Objection to form.

A. So we've moved beyond the advanced development group. You're talking about beyond that time where we decided to commercialize this product, I think, and so -- I think that's what you're talking about.

At that point in time, we collaborated with Dr. Pond's group. We made engineering decisions together in order to make the right product decisions to make a final product, and all of those -- the inkjet printhead -- the silicon part of the inkjet printhead was -- most of the technology experts were in Dr. Pond's group, but we worked collaboratively with them and had to make trade-offs and decisions all along the way. And it wasn't, you know, one team or another "You're just focused on this" or "You're just focused on that." We worked on it together. And in the end, the printhead silicon documentation and drawings and design were produce by the engineering team, by my team, not Dr. --

Q. Again -- I see where the confusion is.

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So earlier you mentioned that the purpose of the advanced development group was to look at a wide variety of non-xerography technologies and make recommendations to the company about which avenues to pursue, correct?

A. Correct.

Q. So I was asking essentially that, like, your group wasn't specialized in focusing -- in chiefly looking at thermal inkjet printheads. You were looking at a wide variety of printheads, and your work involved generally developing ink container concepts and printhead maintenance procedures and hardware for a wide --

THE REPORTER: I'm sorry. He's frozen for me. Is he frozen for --

THE WITNESS: Yeah. He's frozen for me too.

MR. BORSOS: He is.

THE WITNESS: It's not me this time. I was freezing last time.

THE REPORTER: Should we go off the record, Mr. Borsos -- oh, are you back?

MR. BORSOS: Mr. Forghany, are you --

MR. FORGHANY: Yeah.

MR. BORSOS: -- back with us? You froze for about 30 seconds.

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MR. FORGHANY: Oh. Do --
THE REPORTER: And you're frozen again.
MR. BORSOS: And you're doing it again.
I believe your question was going to be did we hear your last question, and the answer is no.
THE WITNESS: No.
MR. BORSOS: You're back.
We did not hear your last question.
MR. FORGHANY: Oh.
MR. BORSOS: And we didn't hear the question asking if we had heard your question, but I inferred that that was what you were asking.
Q. So, Mr. Dietl, earlier you had described the purpose of the advanced development group as looking at a wide variety of non-xerography technologies, not just focused on thermal inkjet printheads. Is that statement still correct?
A. Correct. We were evaluating technologies.
Q. And Dr. Pond's corporate research group had specifically focused on thermal inkjet printheads by contrast, correct?
A. As I said earlier, you'd have to talk to Dr. Pond about whether or not they were working on any other technologies other than thermal inkjet. They did provide the early prototype of a small inkjet printhead

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that we were asked to integrate into a printer demonstration model and to -- and use that, together with them, to demonstrate the technology to management.
Q. And you were -- so you were working with other groups other than Dr. Pond's group during this time period when you were at the advanced development group.
A. Correct. We were working with outside companies also. Right? We were -- some companies were trying to sell -- they had a new technology called magnetography, and this was going to -- this was going to, you know, change the world. Or ionography. There was -- and so we worked with some companies -- LCD image bars, LED image bars. These were companies, primarily in Japan, providing different imaging technologies to compete with the laser that was used in xerography in Xerox machines.
And then we had other technologies that we worked with corporate research on. Like, direct toner marking was one where a scientist in the research labs had developed a way of gaining toner particles using electrostatics direct onto paper.
And so, you know, those were -- we would work with those companies or scientists. We would get early samples. We would try to put together a demonstration

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and then evaluate them based on a set of criteria that we had at the time on whether or not they were going to be disruptive or advantageous or something that we should consider.
Q. Right. I think we kind of lost -- we lost -- we fell out of sync when I asked you whether -- I confirmed that your group was not solely responsible for supporting Dr. Pond's project.
A. Correct. I -- sure.
Q. And so during this -- the time period, were you supporting any other group with thermal inkjet printhead technology other than Dr. Pond's group?
MR. BORSOS: Just for clarification --
A. No.
MR. BORSOS: -- this is in the time period of up to 1995?
MR. FORGHANY: This is -- well, it's the time when -- I'll rephrase my question.
Q. Mr. Dietl, while you were working within the advanced development group at Xerox, were -- did you support any other group besides Dr. Pond's group with thermal inkjet printhead technology?
A. No. Dr. Pond's group was the primary source that we worked with on thermal inkjet technology.
Q. And Dr. Pond's research group, they developed

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and fabricated the silicon device designs and prototype printheads and then gave them to the engineering teams, including the one that you worked on, the advanced development group, correct?
A. Only during the --
MR. BORSOS: Objection to form.
A. Only during the advanced development group period. Subsequent to that, we collaborated on the printhead designs, and we worked with outside silicon fabricators to make the device.
Q. Understood. Thank you for clarifying.
And so around 1988, '89, you know, Xerox reorganized its thermal inkjet resources in a new business unit that included Harrison's team, correct?
A. Yes. That's correct.
Q. And Dr. Pond left the research group and joined this new business unit as the manager of the engineering and manufacturing team that was responsible for the thermal inkjet printheads and inks.
A. Yes. That's what I recall. Yes.
Q. And that's at the point where you became -- you came -- no -- and started reporting two levels down from Dr. Pond in that same team, correct?
A. Correct.
MR. BORSOS: Objection to form.

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Q. And so as I understand it, within this group, Dr. Pond was leading it, and then the manager was Ken Altfather, who reported to Dr. Pond, and then you, Mr. Dietl, reported to Mr. Altfather. Is that correct?
A. That's correct.
Q. And --
A. I mean, there was -- I can't tell you all the different reporting relationships over time. You know, there was a lot of changes over time. But my primary job responsibilities were the same, designing inkjet printheads, ink supplies, and maintenance station subsystems and integrate them into a printer.
Q. And so one of the things that you were working on to integrate was desktop printer programs. Is that correct?
A. That was one of the early products that we decided to commercialize -- try to commercialize. Yes.
Q. And you and Mr. Altfather were responsible for the mechanical engineering aspects of those printers, correct?
A. More than the mechanical engineering aspects. Mr. Altfather's team had the systems -- had systems engineering, mechanical engineering. There was some, you know, fixture teams in order to be able to develop the evaluation. There was also test -- a test

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organization in order to evaluate the product to the requirements of the product. There was -- I'm not sure if the ink development and ink chemistry reported to Ken Altfather. I don't recall.
Q. And you -- your primary responsibility was for printhead maintenance and station hardware designs as well as contributing to the print cartridge ink container design and fabrication. Is that a fair characterization?
A. No. That's not a fair --
MR. BORSOS: Objection to form.
Q. How would you characterize your response- -- primary responsibilities for that group?
A. My primary responsibilities was printhead design and ink supply with some support to maintenance station design.
Q. When you say "printhead design," what are you referring to?
A. I'm referring to getting a set of requirements on what the product has to perform, how it has to perform, making decisions around the architecture of the product, making trade-offs with both the printer side of the design team and the device side of the design team in terms of what's possible, developing technologies that had never been done before at Xerox

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Corporation in terms of how to fluidly interconnect the plastic components of an inkjet cartridge to the silicon components of an inkjet cartridge, the evaluation of printing performance, the evaluation of trying to develop the subrequirements around -- you know, what are the requirements around the pressures that the ink has to be delivered to the inkjet printhead at, and then how to best deliver that.
It goes on and on and on, hundreds of decisions, technology decisions as well as design decisions, and in the end, making those decisions, getting prototypes made, having those -- evaluating those prototypes, making iterative changes, then, to that design until it meets the requirements of the product.
Q. You said that you developed new technologies in this space.
A. Yes.
Q. What new technology did you develop in the -- for a thermal inkjet printhead?
MR. BORSOS: Objection to form.
A. I have 35 patents -- US patents that I got over those years --
Q. And the question was just for thermal inkjet printheads.

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A. -- technologies that were developed to address challenges.
They were all in thermal inkjet printheads.
THE REPORTER: And I lost part of the answer, as the witness froze, just so counsel is aware if you'd like him to repeat it.
Q. Yes, please.
A. So I'm not sure what you lost.
Over the years, I was granted 35 -- as an inventor or co-inventor of 35 US patents. All of them related to inkjet technology and -- that came out of challenges and -- which I consider opportunities -- that present themselves when you're trying to design a new product using a new technology, so...
Q. Did you, while at Xerox, ever contribute any design alternatives involving temperature management of a thermal inkjet printhead?
MR. BORSOS: Objection to form.
A. So the temperature management of the printhead and the performance of the printhead have multiple aspects. Right? And we -- I was definitely deeply involved in coming up with ways to measure and to characterize the temperature of the silicon substrate and of the surrounding elements of the printhead in order to understand and optimize thermal deviations that

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occurred in the device and work on ways to make decisions and come up with ideas and work on ways to improve the products such that they were within acceptable level and we had acceptable print quality.

Q. Was that a yes or a no?

A. So that was a yes.

Q. What design alternatives did you propose for a temperature management concept?

MR. BORSOS: Objection to form.

A. So one example was the heat sink design that we used in the printhead design. The silicon substrate had to be bonded to that heat sink. It had to be bonded with a conductive epoxy, a very thin bond line optimizing that -- those materials, both the heat sink, the adhesive, and then the bonding process to achieve good performance.

Q. That you specifically proposed?

A. Yes. Sure.

Q. And for -- what device was that for?

A. It was for a -- the first monochrome printhead device that was commercialized and actually went to market.

Q. The one that was developed by Dr. Pond's group?

A. No. It was developed collaboratively with

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the design engineering group and Dr. Pond's group.

MR. FORGHANY: Why don't we take a break and go off the record right now.

THE REPORTER: Okay. We're off the record.

(Off the record: 10:14 a.m. to 10:31 a.m.)

Q. Mr. Dietl, before we took a break, we were discussing a heat sink approach or alternative that you had proposed for a thermal inkjet printhead project that you were working on with Dr. Pond in the larger group at Xerox. Approximately what time frame did this work occur?

A. Oh, you know, in between 1987 and 1995, '88 to '95, something in that ballpark. We were working on various product designs and product commercialization.

Q. And was this for a specific product, like a stand-alone product? Or was it for a family of products? I'm just trying to get some terminology around this project.

MR. BORSOS: Objection to form.

A. So the original product that we started to commercialize that I mentioned earlier, which was a flatbed system, multifunction, that was discontinued.

And then we worked then on a black-and-white printer that we did commercialize. It was a 300 dpi

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printhead -- I forget how many nozzles were in that printhead -- and that had an integrated ink supply and cartridge body and printhead. And we worked with a printer partner in Japan to integrate the Xerox-supplied components into the printer that was supplied by the Japanese partner and to put out a product under the Xerox name.

And then subsequent to that, using a very similar platform of that design, we did a three- -- a four-color version of that printhead that had replaceable -- replaceable ink cartridges, CMYK separate ink cartridges. And then on that product, worked with a different printer partner in South Korea. And then the next part of my CV kind of goes into some of the things that happened there with that product.

Q. But until 1995, you said that your work kind of in this -- focused on these -- the flatbed system, the black-and-white printer, and the application of a similar platform as the black-and-white printer but in a multi-via printhead.

A. It was a multi-color printhead. I don't know if we would call it a multi-via printhead, but multi-color printhead.

Q. So what was -- is the flatbed system -- did it have a name we could refer to for today's purposes?

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A. The platform --

MR. BORSOS: Objection to form.

A. -- was -- we called it AMPS.

Q. AMPS? Could you spell that, please?

A. A-M-P-S.

Q. And what was the time frame that you were working on that project?

A. It would have to be in the '97 and '98 time frame -- I'm sorry -- the '87 and '88 time frame.

Q. And the black-and-white printer, what was the commercial name, if you recall, of that printhead?

A. I don't recall the commercial name of the product.

Q. Do you recall the time period that you were commercializing it?

A. It was subsequent to the AMPS, so -- you know, so it would be 1988 to '90, '91.

Q. And you mentioned that it was -- you do recall that it was 300 dpi?

A. I do recall it was 300 dpi. Yes.

Q. And it was a monochrome printhead?

A. That's correct.

Q. And then the third product was a multi-color version of that same printhead?

A. It was -- no. It was a multi-color version

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on the same platform. It was definitely a different printhead.

Q. I see.

A. Yeah. But it was on that same platform, still a 300 dpi, but segmented into the four colors in a row on an edge shooter device. Side shooter I think we called it at Xerox.

Q. Yeah. That's my next question -- go ahead.

A. That was not me.

MR. FORGHANY: I'm sorry. The court reporter, did you have a question?

THE COURT: No. I believe there was some background noise from another participant.

MR. FORGHANY: Oh, okay.

Q. So could you describe generally what you're referring to when you use the term "edge shooter"?

A. So edge shooter and side shooter are the kind of terms that I've heard referred to as the type that -- where the ink is ejected from the printhead in a direction parallel to the surface of the heater.

Q. And that's different from a roof shooter design.

A. Correct.

Q. Could you describe the difference between the two?

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A. In a roof shooter design, the ink is ejected in a direction perpendicular to the surface of the heater.

Q. And Xerox was primarily using a side shooter design for this black-and-white monochrome printhead assembly?

A. Yes.

Q. And had you worked on any roof shooter printhead assemblies prior to that black-and-white monochrome printhead?

A. On -- not on development. We evaluated some products from competitors.

Q. So I'm trying to get an exhibit up on the chat.

MR. FORGHANY: Have the exhibits been uploaded on your side yet?

A. I don't see any new exhibits in the --

Q. Oh, I was speaking to the tech. I'm sorry.

A. Yes. I'm sorry.

THE TECHNICIAN. No, they haven't. I'm not sure what's going on today.

MR. FORGHANY: Okay. So I'll just ask questions about it generally. It's not letting me drop it into the chat.

Q. So the edge shooter printheads at Xerox that we're referring to now, the black-and-white printhead, that was bonded to a nickel heat sink with a thermally conductive epoxy, correct?

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MR. BORSOS: Objection to form.

A. Bonded to a zinc heat sink with a nickel plating with a thermally conductive epoxy.

Q. And was that something that you yourself worked on and decided to do?

A. Yes.

Q. And did the heat sink itself buffer? Did it conduct heat away into the printer printhead mounting features?

A. It conducted heat away from the silicon die and then dissipated that heat to the ambient air.

Q. And that was a design decision that you personally decided to do?

A. Well, it --

MR. BORSOS: Objection to form.

A. It was a collaborative design decision along with -- like everything was. Right? We worked on one of the best technologies to make the product perform to the requirements, and certainly I consulted people in the R&D organization, physicists, and the like in order to make those decisions.

Q. Understood. Yeah.

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And I'm assuming by the collaborative process, you're referring to the weekly or sometimes -- I understand it to be quarterly meetings that would be happening within the group itself, correct?

A. We had meetings and working sessions continuously, multiple times a week. We worked -- this was not a distant relationship between the groups at Xerox Corporation. We were all hands on deck working on the project to commercialize this technology and didn't consider -- I didn't consider any barriers or lines between organizations. We worked collaboratively as one team.

Q. And, you know, the group that we're referring to here with yourself, Dr. Pond, and Altfather, that had weekly technical meetings in which yourself and the other engineers, as well as ink development chemists and thermal inkjet device designers, printhead manufacturing engineers, firmware engineers, they would all participate in these meetings to try to implement this technology in a -- to commercialize it, correct?

A. That's correct.

MR. BORSOS: Objection to form.

Q. And Dr. Pond was the chairman of these meetings, correct?

A. No. I don't believe so.

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Q. Dr. Pond was not responsible for conducting these meetings?
A. No. I don't believe --
MR. BORSOS: Objection to form.
A. -- meetings.
Q. Who was responsible for --
THE REPORTER: I'm sorry. I need the answer repeated, please.
A. I don't believe Dr. Pond conducted the meetings.
THE REPORTER: Thank you.
And, Mr. Dietl, if you could just wait/pause for a second after the question for Mr. Borsos to get his objection in, that would be helpful. Thank you.
Q. Who was responsible for ensuring that the inkjet components would meet their cost, quality, and time schedule for the particular product program?
A. So I was responsible for that for the components that I was responsible to deliver, but ultimately, you know, as you go up the management chain, everybody is responsible that the product makes those cost, quality, and schedule performance requirements. So, you know, I think Dr. Pond was also responsible for that for as long as he was involved with the project.
Q. And that was until 1993, correct?

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A. Yeah. I don't recall his departure date, but I know he didn't -- at some point in time he decided to move on to a different direction.
Q. Well, up until that point, he was the chief engineer on the technical team.
MR. BORSOS: Objection to form.
A. Yeah. That's -- that sounds about right. Yeah.
Q. And you were the team lead on the inkjet components, the ink supply specifically as well.
A. The printhead design, the ink supply, and some parts of the maintenance station design and also the integration of that -- those components into the printer.
Q. And I was going to say "maintenance functions," but then I recalled you didn't like that term too much, so I was trying to avoid it, but -- so what -- your responsibilities did include some maintenance functions as well.
A. Yes.
MR. BORSOS: Objection to form.
A. Yes.
Q. And is it consistent with your recollection that Dr. Pond stepped down as chief engineer in 1994 after Xerox launched its first inkjet product, which was

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code named Corbell (phonetic)?
A. That sounds right. And Corbell was the name of the printhead.
Q. And that's the X4004?
A. Yeah, what was that again? I couldn't recall the name of the product, the printer product.
Q. X4004.
A. X4004. Okay. It was a long time ago.
Q. I would be surprised if you remembered that.
And after Dr. Pond stepped down, you continued to work on follow-on products to the X4004, correct?
A. That's correct.
MR. BORSOS: Objection to form.
Q. And one of those was the XJ4C?
A. That's correct.
Q. And you eventually became the team lead. In fact, you had mentioned before having a seven-month stay in Korea with Lucky-Goldstar.
A. That's correct.
Q. After you -- Dr. Pond stepped down, you started reporting to Ken Altfather, who was now in the role that Dr. Pond had relinquished. Is that correct?
MR. BORSOS: Objection to form.
A. I don't recall the management structure. I

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know that Dr. Stoffel came in there too, but, you know, I don't recall the organizational structure.
Q. Did you still report to Ken Altfather?
A. Yes. At the point where I went to Korea for seven months, I still reported to Ken Altfather. Yes.
Q. Did you keep in contact with Dr. Pond after he left the team?
A. We saw each other on occasion. You know, we were quite friendly, and our wives were friendly. And my wife was an artist and a craft maker, and we had given them some Christmas decorations that my wife made back in the day, so we'd talk about that. So yeah. We'd -- you know, I saw them at, like, dinners and things like that.
Q. And I was asking because I was wondering if you ever had any further collaborations with Dr. Pond after he relinquished his role on the team.
A. I don't think -- I don't recall where he went afterwards and how his involvement was with the inkjet team after that point. I know that after he left -- after he left Xerox and became a licensed patent agent -- I think is what he became -- I did talk to him about an invention that I had that Xerox had released to me that -- what it would take to get that patented outside of the Xerox system. But that's just friends.

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But I decided not to pursue it, which I regret to this day.

Q. And are you aware of a -- that Dr. Pond joined and headed an advanced development chain that was parallel to his old role at Xerox?

A. I don't recall.

Q. Okay. And you don't recall working on any projects with him while he was heading the advanced development chain.

A. I don't recall.

Q. Now, in your expert declaration, you opined on the level of ordinary skill in the art for the '708 and '823 patent. Do you recall that opinion?

A. Yes.

Q. And you took issue with some portion of Dr. Pond's definition of what the ordinary skill in the art would be at the time of the patented inventions.

A. Only a minor aspect of a materials scientist.

Q. Could you explain what you meant by that, what the disagreement is about?

A. A materials scientist typically doesn't get involved in the structure of electromechanical devices and, I don't think, would have run into the trade-offs and experiences that the other roles that I described would have.

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Q. So it's your opinion that someone that possessed a materials science degree and met the experiential requirements of designing thermal inkjet printheads and systems, that person would not be a person of ordinary skill in the art?

A. I think that they could be a person having the ordinary skill in that case if they had the experiential, you know --

Q. I see.

A. -- role -- yeah.

Q. Your opinion is, in a sense, that just -- someone that only has a materials science degree would not be a person of ordinary skill in the art.

A. That's correct.

Q. What role does a -- in your experience at Xerox, for example, did materials scientists have on the team that developed the AMPS printhead, which later became the aptly named X4004 printhead?

A. So, you know, I believe we had some materials scientists in the research group that were analytical chemists. Right? And they helped in the evaluation of problem -- you know, problem solving, being able to identify foreign materials that might be causing a problem, things like that. So we had that type of role.

Q. Causing a problem how?

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A. Oh, by, like, imaging -- imaging the foreign material with a scanning electron microscope or doing an FTIR spectrum on a material to try to identify what the foreign material was, comparing that to libraries to identify materials, things like that.

Q. Are you referring to, like, a piece of contamination -- a contaminant that would enter into the ink supply?

A. Could be, yes.

Q. Oh. Okay. Materials scientists weren't consulted about what type of materials to use, for example, for the resistors?

A. You know, I'm sure they were. Yeah. I'm sure -- I don't know if we had specifically materials scientists assigned to that, but we had, you know, physicists and device scientists that had exposure to those different types of materials and how to evaluate them. So I don't know if their title was materials scientist or not. I think not. I think mostly it was electrical engineers and physicists. But they made those decisions.

Q. Would a materials scientist -- someone with a degree in materials science be able to make those decisions as well?

MR. BORSOS: Objection to form.

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A. If they -- you know, if they had the experience in the field.

Q. Did you ever consult anyone on the team about what materials to use for the temperature sense resistors on the X4004 printhead?

A. I worked with the device designer, who was an electrical engineer, and we just discussed the various options. And his recommendation was a photo -- a thermal diode, I believe, and I agreed with that recommendation, and that's what was used in the device. So it was more of a --

Q. In your --

A. The materials scientists that would know how to make a thermal diode would be at the silicon fabrication company.

Q. During the commercialization stage before the --

A. Correct.

Q. -- internalized at Xerox in the prototyping phase.

A. I didn't. No.

Q. So you were -- you had participated in discussions about, you know, a temperature management approach that would heat the heat sink used in a Xerox edge shooter printhead by means of a heater located in

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what I'm assuming is the printer's printhead carrier.
MR. BORSOS: Objection to form.
A. No. I don't think any of that was -- I'm sorry. There's some confusion there.
There was no heater on the heat sink. The heat was generated by the drop ejection process. The heat sink was simply a pathway for the heat to escape the silicon die and then to be dissipated. There was no heater --
Q. Sorry for assuming things.
A. Yeah. Other than --
Q. Okay. Yeah. I'll rephrase my question.
A. -- other than a drop -- yeah.
Q. I'll rephrase my question.
So you participated in discussions of a temperature management approach that would heat the heat sink used in a Xerox edge shooter printhead.
MR. BORSOS: Objection to form.
A. I participated in discussions that would make the design decisions around how the heat sink participated along with the silicon die in order to create the operating environment for the printhead that was acceptable for inkjet printing, some of which -- which consisted of heat going into the heat sink from the silicon die and dissipating out to the environment.

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Q. And I'm just trying to get more specific when we're talking about, like, decisions. So did you decide on the layout of the inkjet silicon device itself?
A. I participated in trade-off decisions with the person who was responsible to do the layout of the silicon device in terms of the size of the device, the openings provided for ink connection, how much surface area was needed in order to make a reliable ink seal, the bond pads and the spacing of the bond pads and how they matched up with the circuitry on the printhead circuit board. You know, we had to collaborate between the interface -- all the interface points between the silicon die and the rest of the printhead.
Q. Understood. I think -- I like the word -- I mean, it was a more accurate way of saying the trade-off.
So what I'm asking is: You contributed in that you provided changes that needed to occur to accommodate features that you were responsible for, and then that person who was in charge of the layout design of the inkjet device would then implement those layout design changes that you -- that was discussed during -- collaboratively as a meeting.
A. Yes. Correct.
MR. BORSOS: Objection to form.

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Q. And that -- would that also apply to the positioning of, like, temperature sensors?
A. I believe we did collaborate in that discussion on the position of temperature sensors as well as the position of the temperature sensor bond pads.
Q. And, again, it's that you would identify, you know, features or issues with the current design, and then there would be a troubleshooting phase where changes were then identified that would need to be -- the sensors would need to be repositioned to accommodate the features that you were working on.
MR. BORSOS: Objection to form.
A. If necessary. I don't recall that particular need to change.
Q. But do you recall ever personally being responsible for redesigning the layout or for repositioning a sensor personally? Or was that something that was delegated to others on the team?
A. The layout of the silicon die was the responsibility of someone else on the team. There was an electrical engineer whose job was CMOS/NMOS design and MEMS layout. I participated in -- such that -- you know, we developed all the fixturing and evaluation hardware and test protocols to put the printhead at

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various stages of its development maturity through rigors of testing and different duty cycles and different document stress and speeds and producing graphs of the temperature of the silicon die and the heat sink and surrounding environment in order to characterize the system was performing to requirements --
Q. So if -- so if, for example, there was a need to modify the drop-firing pulse energies to manage the printhead temperature, you might have participated in identifying the reason for the need to modify it, but you would not personally have implemented or modified the pulse energies yourself.
MR. BORSOS: Objection to form.
A. Yeah. I think that's accurate.
Q. So is it accurate to say that you have not personally designed a thermal inkjet device that had an on-chip thermal sensor but you've participated in discussions about potential redesigns of that device?
MR. BORSOS: Objection to form.
A. I participated in the design and any potential redesign. I didn't actually put the lines on the computer screen that produced the design. Right? But I participated as much as any collaborative engineering team does around making design trade-offs

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and decisions.
Q. And you mentioned earlier that you don't recall contributing or participating in the -- in any decisions around, you know, where to place thermal sensors on the device.
MR. BORSOS: Objection to form.
A. I don't recall the specific discussion. I'm quite sure that I was involved in those decisions and then asked to evaluate whether or not they were performing properly to meet the requirements.
Q. Do you recall where the temperature sense -- temperature sensors were located in the X4004?
A. I'm not a hundred percent sure, but I think -- I recall that they were quite close to the edge of the die in the back -- in the backside along the bond pads.
Q. So they're on the silicon.
A. They're on the silicon. The temperature sensor was a thermal diode in the silicon.
Q. And how was the firing pulse energy modified?
A. I didn't say the firing pulse -- I don't know what you're talking about. What's the question?
Q. Did you fire energy pulses to maintain the temperature of the silicon?
MR. BORSOS: Objection to form.

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A. No. We did not fire energy pulses to maintain the temperature of the silicon. We fired energy pulses to eject ink and produce prints, which, in turn, generated some inefficiency -- right? -- and some excess heat, which then had to be transferred away from the silicon device and dissipated to the environment.
Q. How were the thermal sensors -- temperature sensors sensing temperature?
MR. BORSOS: Objection to form.
A. A thermal diode is a standard component that was in the tool kit from the silicon fab company that you energize the thermal diode and then get a signal out. And I believe that at the time we actually had an A-to-D converter in the silicon, and so the output of that diode was converted to a digital signal in the silicon, and a digital response was received by the printer.
Q. And this was monitored continuously?
A. I don't believe so. No. I think that it was only monitored in the time of not printing.
Q. Do you recall where the sensors -- the temperature sensors were located on the silicon? Like, were they in between the vias?
A. There was not --
MR. BORSOS: Objection to form.

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A. There was not vias on that printhead. There was a separate channel plate that came in the top. It was not in the silicon -- the device was in -- was a separate piece of silicon. The temperature sensor was located in the -- on the silicon chip in the location of the bond pads, close to the bond pads on that back end of the die.
Q. Was there the -- did that device have the capability to widen firing pulses?
MR. BORSOS: Objection to form.
A. I don't recall. I don't recall if -- I'm pretty sure that it did, but I don't -- I'm not a hundred percent sure.
Q. Who was responsible for the firing pulse power modification features of the X4004 printhead on the team?
A. So we had some engineers on the commercialization team. Mr. Donahue was one engineer on the commercialization team. And then we had physicists in the research team. Dr. Marcum (phonetic) was one that I recall. There were others. There was hundreds of people on this program.
Q. Who on the team would be responsible for monitoring or tracking how heat would be conducted in various areas of the silicon device during the

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commercialization phase of the project?
A. I was --
MR. BORSOS: Objection to form.
A. I was responsible for characterizing the thermal performance of the device and then --
Q. And then --
A. -- and then finding the limits for where that result caused defects and then developing means to keep the performance of the device below those limits.
Q. And you're talking about the temperature on the silicon, correct?
A. Correct.
Q. And you would provide -- that tracked information or the data that you collect, would you apply that and decide where to place the sensor? Or would you give that data to somebody else to help guide the decision on where to place the sensor?
A. No. The --
MR. BORSOS: Objection to form.
A. The data was created after the sensor was already placed. This was a characterization of the performance as a system. So it didn't influence us changing a sensor location.
Q. Who decided to put the sensor in its original location?

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A. So --
MR. BORSOS: Objection to form.
A. It was decided collaboratively, as I said earlier, between me and the design team and the CMOS designer who was doing the layout.
Q. So the CMOS designer that did the layout for the printhead presented you with a layout that did not have a sensor located on it?
MR. BORSOS: Objection to form.
A. No. I think that -- you know, we sat down and we said "Okay. This device needs a sensor." He would recommend that it would go in a certain location and the bond pad would be in a certain location. We talked over what trade-offs that we'd have to make in terms of the board design and the function of the device, and then he went ahead and made those decisions final.
Q. Do you still have your CV in front of you, Mr. Dietl?
A. Yes.
Q. Could you explain the circumstances around your departure from Xerox and what you were working on right before then and then where you worked after that?
A. Okay. So I was a technical program manager working on the next generation inkjet technology beyond

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the XJ4C at higher resolution, larger chip, better performance with still image, side shooter/edge shooter type of device.
And as I was in Korea, the Caribbean project was going on, and I was asked to lead the Aruba project as a technical project manager, which is a non-line responsibility. Right? I was like a chief engineer of all the different functional groups that delivered subcomponents for the Aruba product design. And Aruba was an extension of the Caribbean platform but smaller, lower cost.
And then we also, as part of that, revolutionized the design of the maintenance station to make it a tenth of the cost for the same function and then worked -- I -- you know, a primary part of my responsibility was to work with the Japanese printer manufacturer to integrate that into the product.
And then -- so during that period, Xerox made a decision to discontinue the chip business as a whole, and I was asked to stay on for a while to help people find jobs and move on to the next thing, to sell assets, and to close down the business. It was quite an experience. And then at -- I believe in November of 2001 I left Xerox.
Q. Well, that was admirable of you to help

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people find jobs and sell off part of the business.
I mean, I want to just -- before -- I want to dig into that a little bit more with why the business kind of wound down. But just for purposes of making sure I'm -- we're on the same page with the terminology -- I don't mean to frustrate you with my use of some terms rather than others, but I want to make sure I understand what you mean by the term "platform."
You said "Caribbean and Aruba platform." What part of the printer system are you referring to when you say "platform"?
A. Okay. So in an engineering product design, there's certain key components that you want to reuse in as many products as possible. Right? They're the ones that would require the most investment of time, money, technology. Right? And --
Q. Uh-huh.
A. And so things like the silicon die design and the inks are kind of key, low-level platform elements that you want to reuse as many times as possible, and in getting those stabilized and getting a good design takes the biggest investment. And so Caribbean was the lead product that established the platform of this next generation, which was different than the X4004 and the XJ4C.

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Q. What kind of a system was it?
A. It was a thermal inkjet printer, an edge shooter, but it was a longer die and higher resolution.
Q. And you mentioned that you -- part of your responsibilities on this project was to -- I'll use the word "participate." I know you like that word a lot. You participated and helped develop the design that allowed it to be printing at a higher resolution, correct?
A. Not on the Caribbean platform, no. I was not involved with that. I came in -- you know, I was working on finishing up the XJ4C -- right? -- and getting that into manufacturing; working with the printer partner, because they were delayed; and getting the printer done and then finalizing, you know, the transition to mass production and the integration of that at the same time while the Caribbean platform was being developed.
And so when I came off of the XJ4C and came back from Korea, I was asked to lead the follow-on to the next generation of the platform, which would be a lower cost version, and solving some key problems around costs, primarily. But it used the same silicon chip.
Q. I see. So that's why you're referring to the platform, because you're reusing the same chip, but

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you're cutting -- you're shaving off features that wouldn't affect the functionality.

A. Correct.

MR. BORSOS: Objection to form.

A. And it had met different requirements. Right? There's different segments of the market. There's higher end market requirements and -- but when you want to sell products out of Walmart, you need to have a price point that's $49. Right? And so you might have a smaller printhead, smaller ink supplies with a -- you know, a lower cost printer mechanism. So Aruba was that next generation to try --

Q. Oh, I see. So by -- so I see what you're saying. So --

A. The broader -- you know, depending on your price point --

Q. And it's because the -- during the manufacturing phase, is it correct that some ink supply mechanisms might be considerably more expensive than some more rudimentary ones, and so the cost of the product would be significantly different even though they use the same printhead as the other products?

A. That's correct. And then the amount of ink. Right? Ink is expensive. And so they had smaller ink supplies, and they had a redesigned maintenance station

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that was a tenth of the cost of the maintenance station that was in the Caribbean platform.

Q. So by the time you joined the Aruba team, the platform had -- the printhead had already achieved its higher resolution goals. Your job was to maintain that resolution while finding ways of cutting -- of producing it at a lower cost.

A. Correct. And there was some overlap there. Right? It was started -- the Aruba was started before the Caribbean was actually finalized.

Q. And you -- I know that you came on after the project, but during your role, did you ever learn or do you recall how that high resolution was achieved in the Aruba?

MR. BORSOS: Objection to form.

A. In the Caribbean and Aruba platform, the -- there were changes made to the internal microfluidics of the printhead. We went away from some wet etching techniques to form the channels and used more of a thick film material and depended on thick film more. You know, and so that helped get the higher resolution. The die was also longer -- right? -- bigger. So it was higher productivity, so not just -- that was a key part of the Caribbean platform was to improve the productivity.

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Q. Did they increase the amount of heater arrays that were next to the nozzles?

A. Correct. The number of nozzles and the number of heater arrays increased from the XJ4C.

Q. And that was done -- that was done to obviously increase the resolution by drop size.

MR. BORSOS: Objection to form.

A. It was done to increase the resolution, decrease the drop size, and increase the productivity.

Q. Yep.

And what year was that -- did you take on that Aruba role?

A. 1996 to 2001.

Q. So obviously, by 1996 it was known in the industry that if you wanted to increase the resolution and decrease the drop size, you just could add more nozzles and heaters.

MR. BORSOS: Objection to form.

A. No. I mean, that's -- you make it sound so simple. I mean, there's hundreds of trade-offs, lots of ways to do it. Obviously it's known that to get a higher quality image you want a smaller spot, but -- and then when you have a smaller spot, you've got to put the spots closer together. Therefore, that drives you wanting to do a higher resolution or a smaller pitch.

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But that doesn't come without trade-offs and --

Q. And my question is about the principle versus the application, which I think you're just differentiating. So my question is whether the principle was known, not whether or not someone knew how to implement it in a specific device.

MR. BORSOS: Objection to form.

A. The principle was known, but it's not an absolute principle. Right? Because --

Q. Yes.

A. -- there's a point of diminishing returns that you wouldn't want -- you would trade-off productivity for image quality. You've --

Q. Or space on the -- or space on the silicon, right?

A. Right. There's a balance.

Q. Yep.

And is that the term -- when referring to these kind of principles, like, is that the term you prefer? Or do you have different, more accurate terminology that you think is more -- better captures that idea?

MR. BORSOS: Objection to form.

A. No. I don't really know what you're referring to, but --

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Q. So the concept of a physical principle like increasing the heat around a nozzle for -- to eject ink in smaller droplets, that concept was known in the industry, but it wasn't an absolute concept. How would you describe a principle like that?

MR. BORSOS: Objection to form.

A. So I don't know that the term "increasing the ink around a nozzle -- heat around the nozzle" is an appropriate statement. That's not something you would do. You're optimizing the density, the heater resistor and its resistance, its voltage and pulse duration in order to achieve the correct drop jetting and also the nozzle size, of course, which is a big factor in drop size.

Q. When you say "factor," what do you mean by that, the term "factor"?

A. It's a design choice. Right? You've got to decide on the correct nozzle size for the drop mass that you're trying to eject from the printhead to achieve the spot size that you're trying to get on the page.

Q. And I guess what I'm asking for is how would you -- that statement right there assumes that there's a static relationship or a cause-and-effect relationship between nozzle size, right?

MR. BORSOS: Objection to form.

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A. The nozzle size is one of the factors that participates in drop mass. It's not the only factor. It's one of the factors you consider. And it's a very complex set of trade-offs that you have to make in optimizing any chip for a head drop ejector and system.

Q. And those factors that were -- that are considered, you know, when it comes to implementation or commercialization, do you prefer, like -- those were -- those same factors are considered during every development project. There's --

MR. BORSOS: Objection to form -- objection to form.

A. It depends on the development project and whether or not you're changing the key -- those parts of the drop ejector to achieve your goal of that project.

Q. So would you agree that temperature is a factor, the temperature of the board, like, how hot the heater array -- is the temperature of the board a factor in the resolution -- ink resolution or print resolution?

MR. BORSOS: Objection to form.

A. Temperature of the substrate surrounding the heater arrays is an important factor in the drop jetting performance. Right? And so whether or not that -- whether it's one resolution versus another resolution, that's always an important factor. There's an optimal

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operating window, an operating range that you want to run your device in, and that's based somewhat experientially and somewhat based on the realities of the environment you're working in.

Q. And what is that relationship? Is it -- as the heater arrays get hotter, what happens to the ink drop size?

A. So the -- if you don't change anything else around the jetting parameters, like the pulse length or the -- there's a thing called pre-pulsing that can be used. If you don't change those, then the drop size will increase with temperature until the point where it gets too large and can cause an air -- what's called an air ingestion problem and which will result in a print defect.

Q. And that's the case for everything, right? If everything was -- for every application of the ink printhead -- is if you -- if the heater array gets -- continues to increase in temperature and everything else stays the same, then the drop size will always increase.

MR. BORSOS: Objection to form.

A. Yeah. I hate to use absolutes like that, but I think it's a good -- it's a good guiding principle.

Q. So -- okay. That's what I'm -- that would be a -- one principle, for example, that you would

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consider every time you want to develop and commercialize a printhead.

MR. BORSOS: Objection to form.

A. You have to pay attention to the thermal performance of the device. Yes.

Q. What was the principle around -- how would you describe the principle around nozzle size?

A. The principle around nozzle size. So you have to have a nozzle size that matches -- when you generate a vapor bubble and you push ink towards that nozzle, if it's a smaller nozzle, less ink will come out and be retained in the printhead, and you'll have a smaller droplet. If it's a bigger nozzle, you can have a bigger droplet.

Q. And so a smaller nozzle would be high resolution in that instance?

MR. BORSOS: Objection to form.

A. Not always. So "resolution" is an interesting term. Resolution is typically a product specification that relates to the pattern of droplets on the page. Right? When you have a spec for a printer and it says it's 600-by-600 dots per inch resolution, that means on the paper there's a grid of 600 droplets per edge vertically and 600 droplets per edge horizontally. Right?

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There's a particular drop size that you want in that 600-by-600 grid such that they overlap just enough to fill the raster. Right? You don't want lines on the page between the droplets, but you don't want too much ink down there so that it floods and puddles. And so resolution on the page is very important in terms of what drop mass you use.

But some people talk about resolution of the printhead itself, its pitch. And you could have a printhead with a lower resolution but have a smaller droplet and then use multi passes and things like that in order to get the same grid pattern on the page.

So it's a -- there's a complex set of factors that go into, you know, what is the right drop size for the product you're trying to design, for the productivity you're trying to achieve, and its --

Q. But if you want the drop size -- I'm sorry. Go ahead.

A. I just said and the image quality you're trying to achieve.

Q. But if one were seeking to minimize or decrease the drop size, if everything else was constant, they could achieve that by decreasing the nozzle size.

MR. BORSOS: Objection to form.

A. To some extent. You know, it's not your only

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knob, and you've got to do that in conjunction with the other factors. You don't want to overpower the heater and just have a small nozzle. You want to do them together.

Q. That's one of the -- that would be fair to say that's one of the principles or factors you would consider.

MR. BORSOS: Objection to form.

A. Yes. You want to optimize the drop ejector.

Q. And these were all things that the Xerox team for the Caribbean would most likely have considered or factored into when they were designing the layout of the printhead for the Aruba?

MR. BORSOS: Objection to form.

A. Yes.

Q. You also used the term -- and I'm just dead set on understanding this correctly -- the term -- I'll just get the exact word.

Maintenance functions. What maintenance functions -- what do you mean with that term?

MR. BORSOS: Objection to form.

A. So when the printhead returns --

Q. I apologize. I want to strike that question. I was looking at the wrong part of the transcript.

You used the term "I was a product design

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engineer and a subsystem team leader designing printheads, ink cartridges, maintenance station systems." The maintenance station systems is what I'm asking, what that means, that term.

A. So a term -- I think I might have said subsystem. And it's a term at Xerox that we use when we refer to various parts of the overall printer design. Right? You've got the main board, the printhead. The maintenance station subsystem is one of those subsystems. It has -- it becomes -- it's part of a printer, and its job is to help maintain the nozzle health of the printhead printing system.

And the -- it was done by Xerox as opposed to being done by the printer manufacturer. The design was retained by Xerox, because it's very much integral for the overall performance of the inkjet jetting system, and so we felt it's best to design the printhead and the maintenance station in conjunction. Right?

Q. When you say "performance," are you referring to the longevity of the product or -- of the printhead? Or it would improve the functionality of it as well?

MR. BORSOS: Objection to form.

A. Primarily reliability and jetting robustness. Right?

Q. I mean, so -- yeah. Do you mean that, like,

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if someone used the printhead -- a printer cartridge and then they only -- it fell apart in a month or two, they would be less likely to keep buying printheads from Xerox?

A. That's for sure.

Q. So you said printer platform and maintenance station. Those are all -- those are subsystems that were the cost-cutting focus of your role as the lead engineer -- project manager for the Aruba and Caribbean.

A. Technical program manager. Yep.

MR. BORSOS: Objection to form, mischaracterizes testimony.

Q. How would you differentiate between the printhead and the maintenance station and the platform? Why are the latter considered subsystems?

MR. BORSOS: Objection to form.

A. I mean, the printhead is a subsystem, but it's designed in a platform approach. Right? The platforming is an approach to how a company designs its products so that they can get the most reuse out of the engineering effort and dollars that you spend on commercializing a product. You want it to have legs. So platforming is used in order to make sure you pay attention to that and optimize -- you know, you have a vision of where it's got to go, and you design it to

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have that future in mind and to reuses and extensibility. So that's what platforming is. It's an approach.

A subsystem is an item of the printer design that you deliver. Right? It's a completed part of the product. So a printhead -- a completed printhead is a subsystem. The ink supply could be a subsystem. And the maintenance station is a subsystem.

Q. Right. I guess I'm trying to differentiate between what you consider to be the leading reason why something is selected to be a -- you know, the platforming approach versus -- why wasn't the printhead versus the maintenance station?

MR. BORSOS: Objection to form.

A. There's probably a college course on this. I mean, it's -- platforming has multiple levels. And the lowest level, the items that require the biggest investment, that have the biggest impact on the performance of the system, and that are also your kind of key differentiating technologies for the company, those are at the bottom of the pyramid of levels. Right?

As you go up, there are other subsystems in the product that are important but not as important, and so they could change from product family to product

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family, let's just say.

And then the next level up are -- off of a product family, you might have multiple products with just features -- slight feature changes. And so you can do multiple products that might have slightly different speed or a color scheme in the covers or -- you know, there's all kinds of things that people might want to do to get multiple products over the time.

So platforming has multiple levels. The key at the bottom of the level is the most important aspects of the product design.

Q. So out of the printhead, the maintenance station, and the platform -- the printer platform subassemblies that you were referencing earlier, for the Aruba and the Caribbean, the printhead, then, was the most important or competitive technology for Xerox.

MR. BORSOS: Objection to form.

A. Yeah, I'm not sure I would say that it was the most important competitive -- it's a key -- it's a key contributor to the performance of the product at Xerox. And it's not the printhead necessarily. It's the -- you know, the silicon die.

Q. And that silicon die was which -- when was it developed that was used in the Aruba --

MR. BORSOS: Objection -- objection to form.

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A. It was developed in the time frame between 1994 to 1997, '98.

Q. By Dr. Pond's team.

A. Well, Dr. Pond wasn't there at the time, so it was not by Dr. Pond's team.

Q. Was it based on the thermal inkjet printhead design that Dr. Pond developed as part of the working research group?

MR. BORSOS: Objection to form.

A. Not -- a lot of those same people -- right? -- were there that were involved when Dr. Pond was there, but it wasn't based on that original platform. It changed considerably over time to respond to market forces and product requirements.

Q. But at some point it stopped changing and it became the -- adopted a platform approach to the printhead for the Caribbean and Aruba?

MR. BORSOS: Objection to form.

A. Eventually you have to settle down on the design and commercialize and get the product out.

Q. So as the project manager, you did not make any design changes to the printhead die.

MR. BORSOS: Objection to form, mischaracterizes testimony, asked and answered.

A. So for one thing, it was technical program

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manager, not project manager.

And I don't recall. There might have been some fine tuning changes to the printhead die, but there might not have been. I don't recall -- between Caribbean and Aruba. But for the most part, the size was the same. Right? And the nozzle spacing was the same. Fundamentally, it was very close.

Q. I guess to describe it inversely, as the technical program manager for both the Caribbean and Aruba platforms, your responsibility was on changing the maintenance station and other non-printhead subsystems for the Xerox Caribbean and Aruba products.

A. For --

MR. BORSOS: Objection to form.

A. So for the Aruba follow-on product to Caribbean, we used the same -- if not exactly the same, very close to the same -- silicon die as was used in Caribbean. And the ink supply was redesigned and costs reduced, and the maintenance station was redesigned and costs reduced.

Q. And then why did Xerox decide to wind down its chip business?

MR. BORSOS: Objection to form.

A. The inkjet business was not a chip -- not a chip business. So interesting term. That's --

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Q. Oh. I thought you meant the heater chip -- I think your testimony in the record says chip. But anyways, you meant the inkjet?
A. I said inkjet.
Q. Okay.
A. I didn't say chip. The ink chip business was shut down at Xerox.
I mean, it's high-level, big decisions that were made between, you know, looking at the investment, the marketing investment. You know, Xerox is a business-to-business company. Right? If you look at how Xerox operates, they usually have a direct sales force. They go out and visit customers. They sell them big printers. They weren't a retail company.
And with this inkjet business, you're trying to become a retail company. The investment to enter that market is large -- right? -- particularly from a marketing and name brand recognition -- you don't in Staples looking for Xerox printers. Right? You go in there, and that's not a brand you see. And so they were trying to get themselves established as one of those brands that you see when you walk into Staples.
So that investment was large. The start-up costs were high. The business was losing money. They tried to make some big deals with some companies to keep

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it going and get some investment and some cash flow. That didn't work. And so when that didn't work, the business was shut down.
Q. It's only, like, the non-xerography, like, part of the business, like, that you're referring to, correct? They maintained their core business going forward still?
A. Yep. Yeah. The core business --
MR. BORSOS: Objection to form.
A. The core business was -- of xerography was still maintained. Yeah.
Q. Were there any other parts of the business besides the thermal inkjet printer systems that Xerox had made an investment in and wound down?
MR. BORSOS: Objection to form.
A. Do you mean at that exact same time?
Q. No. Since then or before then.
A. I mean, companies go through investment in areas and -- the investment in areas all the time. I'm sure the answer is yes.
Q. I meant that you personally have experience with -- I apologize -- that you personally have experience with at Xerox.
MR. BORSOS: Objection to form.
A. No, not that I have experience with.

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Q. So when you were tasked with winding down the team, it was just focused on the work around the thermal inkjet printheads, not any other type of technology.
MR. BORSOS: Objection to form.
A. That's correct.
Q. So presumably, when you were part of the advanced development team, Xerox -- its experimentations in those other inkjet printer systems were still ongoing and hadn't been wound down by the time -- by this time in 2001.
MR. BORSOS: Objection to form.
A. I don't understand the question.
Q. I'll move on.
MR. BORSOS: Is this a good time to take a break?
MR. FORGHANY: Yes. Actually, yes. We can go off the record -- well, actually, I have one more question, if you don't mind, Mark. I can just move on to the next topic after the break.
MR. BORSOS: No problem.
Q. Mr. Dietl, the group that was responsible for those three thermal inkjet products, the AMPS, the black-and-white printhead, the multi-color one that eventually became the X4004, what was the name of that

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group? Did it have a formal name?
MR. BORSOS: Objection to form.
A. I'm sure it had -- I'm sure it did. I don't recall what it was.
Q. Would you consider the members that were in the group -- would those members have qualified, in your opinion, as a person of ordinary skill in the art?
MR. BORSOS: Objection to form.
A. Not every member of the team would qualify as that for these cases.
Q. After two years of working on the team, they wouldn't -- they still wouldn't qualify?
MR. BORSOS: Objection to form, misstates character -- mischaracterizes testimony.
A. So not necessarily. There's all different roles in an engineering and manufacturing team that -- you know, some have the right wherewithal and knowledge of all the technology and others do not.
Q. Could you give an example about a position on that team that after two years would still not qualify as a skilled artisan?
MR. BORSOS: Objection to form.
A. In respect to these patents?
Q. Yes.
A. All right. So let's say a technician with an

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associate's degree or even armed services experience and -- a technician working on an engineering team under an engineer who is responsible to put fixtures together and run testing and generate data, that person isn't involved in the day-to-day, bigger picture trade-offs and understanding of the technology to a level to be a person having an ordinary skill in the art.

Q. I guess I'm confused. You're saying there were people on your team that weren't involved in the project on a day-to-day basis?

A. They were. Their role was more focused in the laboratory on minutia and details that didn't expose them as much to bigger picture decision-making -- right? -- and overall trade-offs. This is all -- standard engineering teams is a mixture of diverse talents and responsibilities, and they all together make up a whole that works.

Q. So someone, in your opinion, needed to be involved with the high-level decisions to be considered a skilled artisan at the time?

MR. BORSOS: Objection to form, mischaracterizes testimony.

A. I didn't understand the question.

Q. When you said someone on your team that wasn't, quote, involved in the day-to-day, bigger

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picture trade-offs and understanding of technology, why is that a requirement or a prerequisite to qualifying as a person of ordinary skill in the art, in your opinion?

MR. BORSOS: Objection to form.

A. So I don't think that they would have the experience and -- to be able to make the -- to understand the trade-offs of the design and how it influences all the technology elements in order to make -- to be a skilled artisan.

Q. What -- can you give me an example of a trade-off of a design that they may not appreciate?

A. So an example would be the decision to -- on what ink seal material you use on the -- to seal to the ink slots in the device and its processing parameters around that to be reliable and have a lifetime. Some people don't have enough exposure to the overall process to be able to understand all those trade-offs.

Q. What does that have to do with the temperature management system?

A. You didn't ask me about the temperature management system.

Q. The level of skill in the art is tied to the patent -- the claimed invention of the patents, correct?

A. Okay.

MR. BORSOS: Objection to form. The level of

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ordinary skill in the art is, by and large, agreed between the parties and is clear from the declarations of both experts. If you'd like to ask particular questions about how that's spelled out, that's fine, but I don't see the relevance to these questions.

Q. I'll ask it simply.

How -- when you were determining and opining on the level of skill in the art, Mr. Dietl, did you -- how did you relate it, if any, to the patent claims?

A. So I relate it to having experience in those particular trade-offs in those areas of the design around the selection of ink vias, heaters on both sides of a via, multiple vias on a chip, and the thermal performance that occurs between those vias, having that experience to know what those trade-offs are and what effect it has on the performance of the system.

Q. Right. So the example that you gave earlier about -- wouldn't necessarily then apply, correct?

A. On the fluid--

MR. BORSOS: Objection to form.

Q. I'm sorry?

A. The answer on whether or not -- the fluid seal material would not apply.

Q. And the decisions about, you know, where and how many vias and the placement of the sensors and the

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nozzle size, those were all principles that one would learn on the job?

MR. BORSOS: Objection to form.

A. I think for the most part that that is true in terms of inkjet in particular, since it's a technology that kind of evolved and grew over time organically in a lot of these companies. So there's a lot of experiential knowledge, probably not college courses that you would take on inkjet product design. I --

Q. Presumably -- presumably someone -- I think the example you gave was someone that was tracking data or testing and collecting information. If someone is collecting information on the nozzle dies, they presumably know how that affects -- that it has some correlation or -- to drop -- ink drop size, correct?

A. Not necessarily, no. I mean, a technician in the laboratory -- an engineer writes a test plan, asks them to test it in this way, to collect this amount of data, this type of data, these parameters, report it this way. Then the engineer takes that information and understands how that relates to the performance of the system and whether or not trade-offs have to be made.

Q. Right. So then how would they know whether trade-offs need to be made if they don't realize that

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nozzle size affects drop size?
MR. BORSOS: Objection to form.
A. I don't think that that's part of what we said that was required in a person having ordinary skill in the art for these thermal patents was. I think in general they understand nozzle size affects drop size, but not -- that's not what these patents are about.
Q. Right. I'm more talking about the -- the engineer that you're referring to that were on your team that were collecting data, is it your opinion that those engineers, despite that engineering degree, would not understand that the increase in the temperature of the heater array would affect the drop size of the ink that's ejected out of the nozzle?
MR. BORSOS: Objection to form, mischaracterization of testimony.
I'm just going to jump in and try to cut to the chase here. We can have the question read back if necessary, but I believe the testimony was clear that the engineers would work with non-engineers that would handle data, and I think that your questioning is conflating the two.
A. And that was what I was going to say is I didn't say engineers. I said technicians, associate degree --

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MR. BORSOS: If you'd like to rephrase your question with that in mind, I think you'll get a clearer response.
Q. I'm just looking quickly through the transcript.
Okay. So you're saying that a technician -- that your team had technicians on there that did not have engineering degrees and that those technicians would then not -- your statements about what these technicians may or may not have understood were limited just to the technician, not to engineers on your team.
A. That was my response. Yes.
MR. BORSOS: Objection to form.
Q. Understood. So that does clarify things. So I'll rephrase my question -- my original question.
Of the members on -- at your Xerox team that were working on the thermal inkjet printhead product, of those whom were engineers, would you have considered those engineers to be a person of ordinary skill in the art as long as they had two years of experience working on the team?
A. Yes.
Q. Thank you.
MR. FORGHANY: I'd like to take a break now.
THE REPORTER: Okay. We're off the record.

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(Off the record: 12:10 p.m. to 1:23 p.m.)
THE REPORTER: We're back on the record, then.
Q. Mr. Dietl, before the break, we were discussing your opinions surrounding a person of ordinary skill in the art. Could you explain how you arrived at the skill level that you propose in your declaration?
A. I essentially agreed with Dr. Pond's assessment of it and, you know, made the subtraction of -- the alteration of materials scientist but started from there and agreed with his proposal.
Q. And to what extent did you rely on your personal experiences to render that opinion?
MR. BORSOS: Objection to form.
A. It sounds very reasonable. It was all based on my personal experience. Right?
Q. And so that would include your experiences at Xerox?
A. At Xerox and Kodak, yes.
Q. And so if we could please turn to page -- or actually what has been marked as Exhibit 3, the '708 patent. Let me know when you have access to it.
A. Okay. Did you say page 3?
Q. Is it marked as Exhibit 3. Please take a

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moment to review it, and let me know if it's --
A. Okay.
Q. -- once you're done.
(Exhibit Number 3 introduced.)
A. Yes. I'm familiar with this patent.
Q. And on the third page, Column 1 of the patent, under the background of the invention, it discusses, you know -- there's a discussion there surrounding what's being called a traditional heater chip there on Column 1, line 26. Do you see that term there?
MR. BORSOS: Objection to form.
A. Yes. "In particular, as shown in Figure 1, a traditional heater chip."
Q. Yes.
What is your understanding of the traditional heater chip as it's being used or referred to in that sentence?
A. So in this sentence, he's referring to a multi-color semiconductor printhead, I believe, that has three vias for three colors, cyan, magenta, and yellow.
Q. And what makes that traditional? What makes the heater chip traditional?
A. I think --
MR. BORSOS: Objection to form.

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A. I think it's probably, you know, similar to other products that they were, at Lexmark, designing at the time. Right? That was a traditional, typical design they were using at the time.

Q. The fact that there was three ink vias? Or the fact that they were assigned next to -- or had a corresponding heater array to one side of them? What part of it makes it traditional?

MR. BORSOS: Objection to form.

A. You know, I think that, you know, the fact that there were three colors with three ink vias. I'm not sure what makes it traditional in terms of whether or not the heaters only on one side is traditional and on two sides is less traditional at this particular time.

Q. In your experience, in the 2000- -- 2005 timeline, what was more traditional? What arrangement?

A. I think the market had both. There was not one more traditional than the other. They had nozzles on one side of the via and nozzles on two sides of the via during that time frame.

Q. And this part of the '708 patent, the sentence that we're referring to on line 26, Column 1, it's referring to Figure 1, which is described as a prior art system, correct?

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A. Correct.

Q. And your opinion is that traditional could just be referring to what was more traditional at Lexmark, maybe not so much the industry.

A. I think it was both.

Q. And what was your understanding of this diagram show in Figure 1? Is it -- when it says that it may include three ink vias and that those ink vias each, quote, operate with a heater array, what is it referring to there?

MR. BORSOS: Objection to form.

A. So you're to the next sentence? The cyan ink via operates with the cyan heater array. The magenta ink via operates with the magenta heater array. And the yellow ink via operates with the yellow heater array.

Q. Yes. How is -- what does the term "operate" mean there? What's physically happening?

A. So what a via does, its function is to basically provide a supply of ink to the heater array in combination with other structures in the inkjet printhead.

Q. And -- sorry.

MR. FORGHANY: Madame -- could you repeat back the last statement from the witness.

(The record was read as requested.)

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Q. Right. And so what other structures would there be needed in order for it to operate -- in order for a heater array to operate with an ink via or vice versa?

MR. BORSOS: Objection to form.

A. So I -- many times what there is, is adjacent to the via, there's a section between the semiconductor substrate and the nozzle plate in the partition material layer that's left open for a period of space until you reach -- and that connects that into the channels that are formed with the partition material. And inside the channel or -- and then the -- inside the channel is the firing chamber -- right? -- where the heater resides and ejects ink out the nozzle. So that -- there's that shelf, many times, adjacent to the via that provides ink down along that whole length of channels.

Q. And that's consistent with what you expect a traditional via chip to have, those components?

A. Yes.

Q. And is that for a roof shooter or a side shooter? Does it matter at all?

A. Yes. It definitely matters. This is --

Q. How so?

A. Yeah. This is a roof shooter. A side shooter, the ink is -- there's no via as there is in a

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roof shooter, the via which comes through the semiconductor substrate and feeds into the channels in the roof shooter. There's a top plate that's a separate piece of silicon that gets attached to provide an ink manifold to the device in a side shooter.

Q. And the roof shooter design, there's the resistor that's, you know, going to be fixed to the silicon substrate, and that essentially forms the ink droplets by being positioned within a chamber, heating up the ink through -- that's being fed in through an ink feed slot, correct?

MR. BORSOS: Objection to form.

A. So it feeds -- it heats up the ink that resides in the chamber, which fires the droplet, and then the channel refills with capillary action and pulls ink into the firing chamber from the -- yeah.

Q. And the '708 patent, that doesn't ever describe the specific structures that are needed to -- for the heater array to operate with the via. It just -- correct?

MR. BORSOS: Objection to form.

A. Well, I mean, it describes the via is there and it's positioned next -- it's positioned -- I'm not sure it says exactly where it's positioned in this section, but I'd have to read it more carefully to get

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into what specifically it says about the via and its design.

Q. So I'll represent to you that the words "chamber," for example, don't appear, as others. You can confirm that with a search.

My question is: Is that consistent with what you'd expect a person of ordinary skill in the art to already know would be the structure just from reading -- from looking at the teaching that the ink via is positioned next to a heater array?

MR. BORSOS: Objection to form.

A. I think that it's describing a traditional roof shooter design where an array of heaters are positioned adjacent an ink via.

Q. So just for accuracy, it's your opinion that a person of ordinary skill in the art reading -- who looks at the '708 patent's disclosure and teaching of the use of the word "traditional heater chip" would understand that that term refers to a roof shooter design and includes the components that would be needed and you described earlier for the heater array to operate with the ink via.

MR. BORSOS: Objection to form.

A. Yes. I think a person having an ordinary skill in the art would recognize the '708 patent as

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describing a roof shooter design and would know about the features that are associated with a roof shooter design.

Q. And I guess what I'm saying is -- I'm asking is the term "traditional heater chip" means something to a person of ordinary skill in the art. It means that it has those structures.

MR. BORSOS: Is that a question?

MR. FORGHANY: Yeah. That was a question.

MR. BORSOS: Objection to form.

A. Traditional --

Q. So what I'm asking is whether or not the term -- a person of ordinary skill in the art would understand the term "traditional heater chip" to refer to a system that has those components that you described earlier.

MR. BORSOS: Objection to form.

A. I think that they definitely would in the context of the rest of the patent and the diagrams in the figures.

Q. Looking at Figure 1, for example, what part of Figure 1 makes you believe that is a traditional heater chip design?

MR. BORSOS: Objection to form.

A. So what part of Figure 1 makes me think it's

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a traditional heater chip design? Or what part of Figure 1 makes me think it's a roof shooter?

Q. Why don't we start with the first question. What part of it makes you think it's a traditional heater chip design?

A. It's -- because that's what Barkley calls it, a traditional heater chip design.

Q. Right. And --

A. This is one embodiment that he's using as exemplary to talk about the problem that he's trying to solve.

Q. In Figure 1, the heater arrays are sharing a border in the diagram with the ink vias, correct?

MR. BORSOS: Objection to form.

A. In the drawing, there's a line between the ink via and the heater array. Yes.

Q. So it's -- the heater array is on -- sharing a common border on -- is on the actual -- it's shown to be on the side of -- one side of the ink via.

A. It's shown to be on one side of the ink via. And it's not -- in my opinion, it's not intended to be shown to scale or anything like that. It's just intended to show a relative location.

Q. Right. And even though it's not drawn to scale, the positioning of the Boxes 108, 110, and 112 in

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relation to the long rectangular shapes of the vias, that was intentional, correct?

A. Yes.

MR. BORSOS: Objection to form.

A. Yes. He's intending to show that for -- they're a pair. The via and the heater array are together in this single heater array system. Each one needs it.

Q. And --

A. Each array needs -- it needs a supply of ink, and so -- and he's intending to show in this case that they're on one -- only one side of the ink via.

Q. And what is your understanding when they're shown to share a border on one side? Does that show -- even though it's not drawn to scale, what do you -- what, if anything, do you understand that to convey?

MR. BORSOS: Objection to form.

A. I think that the yellow heater array is associated with the yellow via, and the magenta heater array is associated with the magenta ink via, and the cyan heater array is associated with the cyan ink via. I don't think there's anything more implied there.

Q. So if it was -- well, first, what do you mean by the term "associated with"?

A. The ink for the yellow heater array is

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supplied from the yellow ink via.
Q. So the yellow heater array is essentially, you know, sitting above the chamber of the yellow ink via.
A. Can you say that again? I'm not quite sure I understood the question.
Q. Earlier we were talking about how the heater arrays -- where they were positioned in relation to the ink vias in a traditional heater chip, and we had -- and you had described some of the components that were, you know, commonly found in traditional heater chips for the heater arrays to operate with the via, and one of those components was the chamber. Do you recall that conversation?
A. Yes.
Q. So when you say that the yellow heater array is associated with the yellow ink via, are you suggesting that it -- it's approximately located within the chamber of the -- within that chamber that's associated with the yellow ink via?
MR. BORSOS: Objection to form.
A. No. I don't think the -- the via and the chamber are two different things. The ink is a -- the via is a supplier of ink from the backside of the -- so it can substrate to the topside of the silicon

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substrate, and then the ink flows along the topside of the silicon substrate until it gets to the drop ejectors and the heater array.
Q. The ink heat slot is part of the via, correct?
MR. BORSOS: Objection to form.
A. It is a term that is sometimes used synonymous in these patents. Right? Some patents it's called ink feed slot, and in some patents it's called via, and they refer to the same thing but different terminology.
Q. So what is being graphically represented in Figure 1 with the -- with Box 102, 104, and 106? What components are within those boxes in a traditional heater chip design?
MR. BORSOS: Objection to form.
A. It's a slot through the silicon. That's --
Q. And is there a chamber within that -- somewhere near that slot?
A. At some point away from it there's a firing chamber, but it's not specified clearly in this figure, you know, the details of -- between the ink via and the chamber.
Q. But that's what you would expect in a traditional heater chip design, to have that chamber,

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correct?
A. You would expect a chamber, but --
MR. BORSOS: Objection to form.
A. You would expect a chamber, but, you know, you don't know where it is in position to this -- in this via. It varies per product.
Q. The chamber would need to be located proximately to the heater array, though, correct?
A. The heater resides in a chamber. Right? And so it's -- the chamber itself is associated with the heater.
Q. Right. And so then what is Figure 1 telling you about the chamber?
A. I mean, Figure 1 is -- I assume that the heater -- the heater array has a series of heaters and a series of chambers.
Q. That's because the -- again, the term "traditional heater chip" and the disclosure that there's these ink via that's associated with and operates with the heater array, correct?
MR. BORSOS: Objection to form.
A. That's because as a person having ordinary skill in the art looking at a roof shooter design, you know, that's how they're structured within a -- you know, within a reasonable range of different

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architectures and configurations.
Q. And so what is your understanding for how -- let me strike that.
If you look at Figure 2 next, what is your understanding about how that figure operates in comparison to the -- sorry. Let me rephrase that question.
What is your understanding of Figure -- of the arrangement shown in Figure 2?
A. So in the arrangement shown in Figure 2, the inventor is illustrating that in a device that has three ink vias with heater arrays associated with each ink via, that the temperature sensor resistor can be positioned adjacent each of those heater arrays in order to measure the temperature that is of interest for the operation of that heater array.
Q. And so the same diagram box -- like, illustrations of a box, a rounded, elongated box representing an ink via being positioned on the same border as a heater array, you understand -- do you understand that to have any -- let me start over.
What, if any, significance did you find in the '708 patent's use of the same box diagram to show a via and array in Figures 2 and 1? Was that intentional?
MR. BORSOS: Objection to form.

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A. I don't -- can you repeat the question?
Q. So Figure 2 uses the same type of shape in the diagram to illustrate or to symbolize an ink via, right?
A. Yes.
Q. And it uses the same box shape to illustrate or symbolize, you know, the heater array's relative position with the via, correct?
A. Yes.
MR. BORSOS: Objection to form.
Q. As a person of ordinary skill in the art, what impact, if any, did that have on you?
MR. BORSOS: Objection to form.
A. I don't -- does it have an effect on me. I mean, I -- this is the similar device as in Figure 1 but with a different approach for positioning a temperature sensor, one for each heater array.
Q. And that is my -- is what I'm getting at here is, you know, because of -- was the reason -- was Barkley's decision to illustrate the via and heater arrays in the same way in Figure 1 and 2 -- did that inform your opinion about whether or not the system in Figure 2 was also a traditional heater chip design?
MR. BORSOS: Objection to form.
Q. I'm sorry. Did you respond?

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A. I did not respond. No.
So I don't see anything in the specification that says that Figure 2 is implying something different than what's in Figure 1 in terms of the heater arrays -- heater array design in respect to the vias.
Q. Did you interpret Figure 2 to be the untraditional heater chip arrangement and Figure 1 to be the more traditional one?
A. No. I just consider Figure 1 to be one arrangement and Figure 2 to be an alternate arrangement whereas the temperature of each heater array is measured in Figure 2 separately.
Q. So both the heater chip arrangement in Figures 1 and 2 were both known to one of skill in the art.
A. I think they're both understood by one skilled in the art. Yes.
Q. And does Barkley's use of the same rectangular, you know, form of the ink via and a heater array and their positioning -- position on the border of the via -- does that suggest to you, as one of skill in the art, that the ink vias shown in Figure 2 operate with the heater arrays in the same way that the vias in Figure 1 operate with the via arrays there?
A. I don't think he goes into enough detail to

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make that distinction. Right? Is there any difference -- so he doesn't point out a difference.
Q. Right. What does that -- but does that suggest one way or the other -- how does one of skill know what's going to be -- what components are needed or used in that to operate with the heater array?
A. I don't think --
MR. BORSOS: Objection to form.
A. I don't think he's trying to show a difference in how the vias operate and how ink is supplied to the heater array. He's illustrating a difference between how temperature sensors are routed in an average of the entire die approach versus a per heater array approach, per color approach. That's --
Q. And is it fair to say that by highlighting that distinction he's trying to convey that everything else stays the same?
MR. BORSOS: Objection to form.
A. I don't think it -- I don't think he says it matters. Right? So...
Q. Earlier you mentioned how, you know, this is -- heater array designs were particularly, you know, often a cost-benefit analysis where, you know, adjusting one feature or factor would affect another. Is it fair

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to say that by emphasizing one distinction here being the location and placement of a temperature sensor resistor and not highlighting any other differences, that one of ordinary skill in the art would understand that the -- Barkley's use of the same illustrations and location of heater arrays next to the vias was intended to show that all other, you know, factors were going to be maintained -- be the same?
MR. BORSOS: Objection to form.
A. I don't know what his intention was in terms of whether or not he expected someone to think all other features were the same between the position of the via and the heater arrays. His intention was to show the difference between different ways to position the thermal sense resistor.
Q. I appreciate that distinction. I'm more asking about your opinion about what a person of ordinary skill in the art would take away from reading this. I mean, they'd have to know that something -- some structure is going to be there. And so what would be the -- their -- what would they walk away with after reading, you know, the '708 patent?
MR. BORSOS: Objection to form.
A. I think they would walk away saying it's not really relevant to the idea that he's trying to

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communicate and the problem that he's trying to describe that he's trying to solve. And they wouldn't -- a person having ordinary skill in the art wouldn't dwell on whether or not there's differences between that. They're both referred to as traditional heater chips. Right?

Q. Right. And so --

A. So...

Q. If in Figure 1 a traditional heater -- it says a traditional heater chip has -- the heater array is going to be on one side of the ink via and -- forming nozzles from those chambers and that it would share one side from it, changing that orientation or location in Figure 2 would make a difference, correct?

MR. BORSOS: Objection to form.

A. In what way?

Q. So if the heater array was further apart from the ink via or had a larger nozzle size -- resulted in a larger nozzle size, that whatever orientation or arrangement you -- it would ultimately affect what it talks about as being -- providing ink drop sizes.

MR. BORSOS: Objection to form.

A. None of those details are shown in these rudimentary figures. I don't have, you know -- nor discussed. So I don't know -- I don't know how to

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answer that question.

Q. So on Figure -- on Column 1, line 40, it says "The configurations providing ink drop sizes of less than 4 picoliters while achievable -- achieving a vertical resolution of about 1200 dpi, dots per inch, or better. Therefore, it is desirable to position heater arrays on both sides of the ink vias, which allow the ink vias to provide smaller ink drops in order to achieve higher printing resolutions."

A. Okay. That's true. When you go to smaller drop sizes and you're trying to get higher resolution, there's physical constraints around how tightly you can put the nozzles together. So putting them on opposite sides of the ink via allows you to use pitch doubling to interleave those heaters and allow you to achieve higher resolutions and use a smaller drop size.

Q. And that's --

A. True statements.

Q. That's desirable -- it says it's desirable to position heater arrays. So this is all -- so the position of a heater array is an important factor into determining the correct drop size, correct?

A. He's saying --

MR. BORSOS: Objection to form.

A. What he's saying is that the position of

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heater arrays on one side of an ink via versus positioning heater arrays on both sides of an ink via allows you to use interleaving to get higher resolution and smaller drops.

Q. Understood.

Would you have interpreted Figure 2 differently if it had drawn the heater arrays as a triangle and it kept them in a square in Figure 1?

MR. BORSOS: Objection to form.

A. I don't know what you mean by "a triangle."

Q. So in Figure 1, the heater arrays are drawn in 20- -- in 10- -- they're shown as 108, 110, and 112. They're drawn as long rectangles, correct?

A. Yes.

Q. And if, then, in Figure 2 they were drawn as triangles that were not sharing a border with the ink via, as a person of ordinary skill in the art, would that tell you something or inform your opinion about what's going on in Figure 2?

A. If they --

MR. BORSOS: Objection to form.

A. If they used a different shape to outline the resistor array in those two figures, one having ordinary skill in the art would ask: Is the inventor trying to show me that there's a difference between -- and look

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for that difference in the specification. What are they describing?

Q. And so inversely, it's fair to assume, then, if every -- if those shapes stayed the same, the inventor is telling me that it's not important and there isn't any meaningful differences.

MR. BORSOS: Objection to form.

A. I would agree that the inventor was saying it's not important to the point that they're trying to make in this patent.

Q. How does the -- Barkley refers to -- in Column 1, line 38, he says, quote, traditional use of a single heater array on a single side of an ink via limits the achievable printing resolution, including the vertical resolution.

How does positioning the heater array on one side of the via limit the achievable printing resolution, in your opinion?

MR. BORSOS: Asked and answered.

A. So the technology limitations of how closely you can space heaters and chambers limits how -- what resolution you can get in a column near array. Now -- and so what they can do is -- you know, the technology only supports so small a density -- or so high a density of nozzles, but if you want higher resolution, then you

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can put a whole equivalent number of drop ejectors on the other side of the via and position them vertically offset by one-half of the pitch between the heaters on the other side, and that would give you a vertical resolution twice that of what you have on a one side.

Q. And when Barkley uses the phrase "the traditional use of single heater array on a single side of an ink via," what is the -- what is -- traditionally, how far apart are the heater arrays from the chamber?

MR. BORSOS: Objection --

Q. Is there a range that they traditionally fall into?

A. I'm not quite sure you're asking the question correctly. Are you asking what was the -- what was the typical pitch that was achievable in 2005?

Q. No. Let me just read it back.

So you mentioned that -- you mentioned the distance between the chamber and the heater array in your prior answer. You referenced that distance.

A. I --

MR. BORSOS: Object based on a mischaracterization of testimony.

You can go ahead and answer if you can, Mr. Dietl.

A. What I referenced was the center-to-center --

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what I was trying to say is the center-to-center distance between heaters is limited by the barrier material technology, the chamber material technology, and how tightly you can position them.

Q. How tightly you can position...

A. Position heaters is limited by the design of the heater, the chamber surrounding it, the minimum wall thickness that you need between chambers, and the manufacturing tolerances associated with putting this device together.

Q. Right. And what I'm asking is: In the traditional heater array -- in the traditional use of a single heater array on a single side, what is typical in the -- numerically in the range of constraints between the heater array and the chamber walls?

MR. BORSOS: Objection to form.

A. I can only tell you what the '708 patent says is that they're able to achieve a vertical resolution of 1200 dots per inch when they're on two sides of the -- when they put a heater array on each side of the via. And so that would -- that would imply that they can do 600 dpi on one side of the via. Right? So that would be the limit of the technology that he considers traditional at the time.

Q. How does -- why does that imply that? How did you reach that implication?

A. Because the person having ordinary skill in the art understands that how you -- how you improve vertical resolution of an inkjet device is by positioning a heater array on the opposite side of the ink via and offsetting the position of that array by one-half of the pitch of the heaters on the other side of the array. And that gives you twice the resolution. So each side has half the resolution.

Q. One of ordinary skill in the art, how would they know how far the offset needs to be in terms of microns? Is it, like, a known number?

MR. BORSOS: Objection to form.

A. The center-to-center spacing at 60 -- at 600 dpi is approximately 43.3 microns between the centers of heaters. And so that's the number you're looking for.

Q. That's what -- you're saying one of ordinary skill in the art would generally know that information.

A. Correct.

Q. And so by suggesting the staggering approach and putting them on both sides of the vias, Barkley is teaching that having the heater array on both sides would essentially provide smaller ink droplets, which translates to a higher resolution, correct?

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MR. BORSOS: Objection to form.

A. So that's what he's saying in that paragraph. Right? That --

Q. Yeah.

A. -- the configurations shown in Figure 1 and Figure 2 may have difficulty -- significant difficulty providing ink drop sizes of less than 4 picoliters while achieving a vertical resolution of about 1200 dots per inch or better.

Q. Right. And that was -- I mean, the principle or factor of, you know, increasing -- making the drop size smaller by increasing or -- you know, the temperature or adding the heater arrays to make the ink size smaller, that's the principle that one of ordinary skill in the art would have known at the time, correct?

MR. BORSOS: Object to the form.

A. So, you know, the way it's phrased is not what one having ordinary skill in the art would say -- you're doing it to make the spot size -- to make the drop size smaller, but the drop size smaller is a consequence of achieving the 1200 dpi spacing. And then, of course, once you get twice the resolution and twice the nozzles, you can reduce the drop size to still fill the raster.

Q. I see. Yeah. And I think we're saying the

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same -- I'm not suggesting that one of ordinary skill in the art would have known where to put the heater array. I'm suggesting that they knew that positioning a heater array near a via results in smaller drop sizes.

MR. BORSOS: Objection to form.

A. No. What results in smaller drop sizes is the design used -- the heater you use, the heater size used, the heater resistance, the nozzle size. The pulse length determines the drop size, not whether -- you can print with a small drop size with this configuration in Figure 2. Okay? But you may have to -- you may have to do multiple passes of the printhead across the page in order to fill the raster.

Q. I'm just trying -- I understand what you're -- how you interpret line 44 through 46 in Column 1 of Barkley where it says "Therefore, it is desirable to position heater arrays on both sides of the ink vias" rather than one.

And then he says "Which will allow the ink via to provide smaller ink drops in order to achieve higher print resolution."

And I'm asking. How do you reconcile that statement in Barkley?

MR. BORSOS: Asked and answered.

A. So I don't think it's the best use of the

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English language in the world in how he wrote that, but what I interpret, being a person having ordinary skill in the art, is that if he is limited to 600 dots per inch and -- on one side of the array, that he can then get the vertical pitch to 1200 dots per inch in combination by putting heater arrays on both sides of the via. And then, in turn, he can -- because he has more jets to fill the raster, he can reduce the drop size.

MR. BORSOS: Mr. Forghany, I'd just like to make a suggestion that you ask a yes or no question about whether reducing drop size necessarily increases resolution.

MR. FORGHANY: No, I understand that point of it. I'm just trying to get at another issue.

Q. So is it fair to say, then -- give me one second. Let me just pull up the realtime.

At the time in 2005, are you aware of any printing systems that were able to achieve a vertical resolution of about 1200 dpi that were in the market?

MR. BORSOS: Objection to form.

A. I would say yes. I think there were. Yeah.

Q. And how did they achieve that resolution?

A. I think they achieved that resolution by putting heater arrays on each -- one on each side of a

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shared ink via in most cases. I think there -- I don't know if there were other cases where they did it in other means, but the case I know about is they would do it on -- put an array on each side of the ink via and then use pitch doubling to have the net resolution be 1200 dpi.

Q. And then how would they compensate or provide adequate thermal control, then, once the heater arrays are positioned on both sides of the via?

MR. BORSOS: Objection to form.

A. It would depend upon their requirements and the problems that they faced. I think -- I don't recall any example that I know of whether or not they had a temperature sensor positioned in between -- in the regions in between the vias. I don't think they did. I think that the case that I'm aware of used average die temperature and managed image quality from that single average temperature measurement.

Q. How would they take the average temperature measurement of the die?

MR. BORSOS: Objection to form.

A. In a manner similar to Figure 1.

Q. A serpentine configuration?

A. Yes.

Q. What would be the purpose of measuring the

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temperature of the average die in that instance if you can't control -- or you can't regulate -- or the temperature in specific regions of the board?

MR. BORSOS: Objection to form.

A. If -- it's very possible that for some architectures and some configurations that -- because the silicon is very conductive, that the average temperature of the die is adequate to give you the information you need to manage the firing parameters to compensate for temperature. And so those temperatures -- any temperature differences that might be in those regions would not -- are not causing a problem so that they're able to do it without concern of that.

Q. So what would be the benefit of them monitoring on a per region basis?

A. So in the --

MR. BORSOS: Objection to form.

A. In this particular case, the inventors of the '708 patent had identified a reason that in their configuration it was consequential, and they had to -- they had to put a temperature sense resistor in between each set of two 8 vias to manage the temperature in that region between the vias.

Q. Where does Barkley explain the reason why it

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was consequential to do so and if so?
MR. BORSOS: Objection to form.
A. So Barkley says in Column 1, line 47, "For proper functionality, inkjet heater chips need to monitor and maintain the silicon substrate of the heater chip at an acceptable temperature for printing. If the temperature is too low, the ink drops formed will be smaller and have a lower drop-weight than required for good image quality. As the temperature rises, the drop-weight of the drop will rise. Variations in drop-weight will cause visible hue shifts in the printed image."
Q. How does that relate to his specific system?
A. Then he goes on to say that "When a heater array is positioned on both sides of an ink via, the temperature sensing and regulating devices utilized in the prior art do not provide adequate thermal control. A serpentine temperature sense resistor, as depicted in Figure 1, is not capable of discriminating between individual colors of the heater array and does not provide any feedback on temperature difference between the various areas of the heater chip. Further, monitoring and regulating the operating temperature on a per color basis by situating a temperature sense resistor on the same side of each respective ink via, as

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shown in Figure 2, is insufficient due to the fact that heater arrays of more than one color now occupy the silicon region between ink vias. Without accurate temperature readings, the method of providing fire pulses to regular thermal conditions on a per color basis would also be subject to error."
Q. That just refers to the first arrangement, generally, the serpentine, which you acknowledge was not as accurate as the second arrange- -- as the, you know, putting a sensor in the middle, but you could basically get close enough.
MR. BORSOS: Objection to form, mischaracterization of testimony.
A. The paragraph I read refers to both cases. The serpentine and also the temperature sense resistor on the same side of each respective ink via, as shown in Figure 2, is insufficient due to the fact that heater arrays of more than one color now occupy the silicon region between ink vias. Without accurate temperature readings, the method of providing fire pulses to regulate thermal conditions on a per color basis would be subject to error.
Q. My question is: How do you reconcile that statement with your previous explanation of how the serpentine can get you, you know, close enough value of

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a temperature?
A. Because not every --
MR. BORSOS: Objection to form.
A. Because not every design has the same constraints and has -- experiencing the same problems. Or the heater arrays are not -- the drop ejectors are not as sensitive to temperature in some as in others. Or they have additional means for modulating the drop size based on the average temperature.
So in this case, Barkley is saying that he thinks it's a problem and he needs to solve his problem and -- because that's what they're experiencing. That doesn't mean that every design out there would have this same problem.
Q. So the features that Barkley tells you are not important, like how the heater array operates with the via, are the same ones that he relies on to show that in some applications they might be a problem?
MR. BORSOS: Objection to form, mischaracterizes testimony.
A. I'm not sure I understand the question.
Q. How is one of skill in the art able to understand the conditions that would cause errors in providing fire pulses that would warrant or need the arrangement that Barkley teaches in the '708 patent?

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MR. BORSOS: Objection to form.
A. They would test and characterize their devices and make a determination of whether or not it's needed or not based on the functionality that they're achieving.
Q. So another way -- one of ordinary skill in the art would understand the fact that a heater array -- "more than one heater array now automatically occupies a region between ink vias" does not mean that it will result in the system automatically becoming subject to error. It'll depend on the specific system and the test data of the -- a skilled artisan collects.
MR. BORSOS: Objection to form.
A. That's correct, in my opinion.
Q. Looking at Figure --
MR. FORGHANY: I'm going to send something in the chat. Let's just mark this as Exhibit 4.
(Exhibit Number 4 introduced.)
Q. Please feel free to quickly flip through it, and you'll see pretty quickly what it -- and let me know when you're done reviewing it.
A. It's not in my chat yet.
Okay. What am I seeing? A table of your directory?
Q. No. It's the -- do you have Exhibit 4,

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annotated PDF?
MR. FORGHANY: And, Michelle, the -- I just pulled it up right now too. This has been marked as Exhibit 4.
MR. BORSOS: There's an image that was dropped in prior to Exhibit 4. I think it was on your clipboard, so -- just to clear things up.
MR. FORGHANY: Oh. Thank you.
MR. BORSOS: There should be a Dietl Exhibit 4 that appeared more recently than that.
MR. FORGHANY: That was the image I sent to try to explain where the documents I uploaded were.
MR. BORSOS: Yeah. That appears twice in the chat, so --
MR. FORGHANY: I see.
MR. BORSOS: It was just dropped a minute ago and then Exhibit 4.
A. Okay.
Q. And do you recognize Exhibit 4 just to be colored and annotated, you know, versions of Figures 1 and 2 of the '708 patent?
I can represent that they are. It wasn't a trick question.
A. Yeah. Yes.
Q. And so looking at Figure 1 on page 1 of the

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Exhibit 4, you see here that we've -- the vias are all highlighted there. And that's 102, 104, and 106.
MR. FORGHANY: I'm getting some feedback on my end.
If you'd please go to the next page, Michelle.
Q. So if you look at Figure 1 on the left there for the cyan ink via. And Barkley says in Column 2 -- Column 1, lines 40 through 47, it -- "The configurations providing ink drop sizes of less than" --
THE REPORTER: Can you slow down for the court reporter, please.
MR. FORGHANY: I'm sorry.
Q. In Column 1, lines 40 through 47, Barkley explains that, quote, the configurations shown in Figures 1 and 2 may have significant difficulty providing ink drop sizes in that resolution. Therefore, it is desirable to position heater arrays on both sides of the ink vias.
And my question is: Doesn't Figure 1 already show a heater array positioned on both sides of at least the ink via shown as 102?
MR. BORSOS: Objection to form.
A. No, not in what he's intending to say. He's intending to say that the -- you'll have another cyan

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heater array on the right side of the cyan ink via and another magenta heater array on the right side of the magenta ink via and another yellow heater array on the right side of the yellow ink via.
Q. When you say on the right side of it, do you mean, like, directly attached to it on the border?
A. So there's a --
MR. BORSOS: Objection to form.
A. There's a cyan heater already on the left side of the cyan via in Figure 1. Do you agree?
Q. Yeah. So why don't we look at the -- in Exhibit 4 --
MR. FORGHANY: If you could zoom out, Michelle.
Q. In the box/column that's titled "Number 3," you see that we have via 102 and then cyan ink via. And then cyan heater array, that's 108. And then the magenta heater array, 110.
Now, I guess what I'm asking is: Why is it your opinion that a person of ordinary skill in the art would not see this and interpret it as being one heater array on each side on the left -- one on the left side and one on the right side of the cyan ink via?
A. Because a person having ordinary skill in the art would look at Figure 3 where Barkley shows exactly

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what he's referring to.
Q. And the difference between Figures 1 and 3 would just be that the heater arrays -- that there's one heater array literally bordering each side of the ink via.
MR. BORSOS: Objection to form.
A. It shows that there's a cyan heater array on the left side of the cyan ink via and a cyan heater array on the right side of the ink via; a magenta heater array on the left side of the magenta ink via, a magenta heater array on the right side of the ink via; and a yellow array on the -- and vice versa for --
Q. Let me rephrase my question.
Are you suggesting that it's more important that the phrase "cyan heater array" appear in the box? Or that it's more important that the box be positioned directly next to the ink via?
A. It's more important that they all have the same color, because the ink is coming out of one via supplying two heater arrays.
Q. Okay. In Figure 1, if what's being labeled as "magenta heater array 110" -- I'm sorry. 110 -- if that was labeled instead "cyan heater array," would that then be an example -- would that then -- would one of ordinary skill in the art understand that to then be a

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disclosure of a heater array on each side of the cyan ink via?

A. That is too speculative. You know, that doesn't make any sense given what -- the configuration that they've shown here and a person having ordinary skill in the art's understanding of how ink vias work. And so I don't --

Q. So there's no significance in the fact that there's some physical distance, a gap in white space between the ink via and the heater array -- while they're not drawn to scale, as a relative -- positioning wise, is that distance significant to you at all as a person of ordinary skill in the art?

A. Yeah. I --

MR. BORSOS: Objection to form.

A. I'm not sure it's the distance. It's just the -- it's not necessary when you have a Figure 3 that shows you exactly what he's talking to. And so this isn't something that would come into question.

Q. Well, it's informative -- would you agree that it's informative in that the arrangement that's shown in Figure 1, while a heater array is shown as -- one on the left side and on the right side, it helps to inform a person of ordinary skill's opinion about what the term -- you know, an array disclosed on each side of

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the ink via must mean?

MR. BORSOS: Objection to form.

A. I think it's pretty clear what he means, because he demonstrates it in Figure 3.

Q. Okay. What does the term -- do you have an opinion on the plain, ordinary meaning of the term "disposed adjacent" to -- "disposed adjacent"? "A heater array disposed adjacent each longitudinal side of the ink via," what does that term mean to you?

MR. BORSOS: Objection to form.

A. That is the ordinary meaning of "adjacent." It's next to.

Q. Not within.

A. Next to is, I think, the ordinary -- the ordinary meaning.

Q. Is it immediately next to or near?

A. Functionally next to, I think. You know, adjacent for its function. For the ink to get into that heater array, it has to be adjacent to the point where it's functionally next to the via.

Q. So what in Figure 2 -- Figure 3 informs you that the magenta heater array 315 is functionally next to the magenta ink via? What is illustrated there that conveys that to you?

MR. BORSOS: Objection to form.

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A. It's a schematic representation of the order and position of these elements of this inkjet printhead and...

Q. Is the magenta heater array 110 in Figure 1 -- is that adjacent to the cyan ink via 102?

MR. BORSOS: Objection to form.

A. Can you repeat the question?

Q. Looking at Figure 1 of the '708 patent, is the magenta heater array 110, in your opinion, disposed adjacent a longitudinal side of cyan ink via 102?

A. No.

Q. Why not?

A. Because I know as a person having ordinary skill in the art that you wouldn't associate a magenta heater array adjacent to a cyan ink via because it's -- that's the wrong color ink to feed through those channels. You would position the magenta heater array adjacent to the magenta ink via.

Q. And so because it's not sharing a border and there's a gap of white space between the heater array 110 and ink via 102 in the diagram, a person of ordinary skill in the art would understand that it's not disposed adjacent to, correct?

MR. BORSOS: Objection to form, and it mischaracterizes testimony, asked and answered.

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A. So I wouldn't -- you know, this isn't a real case. This is a hypothetical. But I wouldn't consider the magenta heater array adjacent to the cyan ink via for the reasons that I've already said. It's a different color ink.

Q. Right. But the patent claims require that a heater array be disposed adjacent each longitudinal side of the ink vias. That's what Claim 1 says.

And so my question is: Looking at Figure 1, in your opinion, is the magenta heater array shown in Figure 1 a heater array that's, quote, disposed adjacent one longitudinal side of the cyan ink via?

MR. BORSOS: Objection to form, asked and answered.

A. I'd say it's not, and I'd say that Figure 3 shows what is meant as the -- according -- which is according to the embodiment of the present invention, not the prior art.

Q. And the difference between Figure 1 and Figure 3 with respect to that specific heater array is that it's sharing a border with and directly next to the ink via, correct?

A. That's correct. And then, you know, you have to look at -- you can look at the overall pattern. Right? I mean, this is a -- there's a pattern here

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where the cyan heater array is on the left side of the cyan ink via, and the cyan heater array is on the right side of the ink via. Whether or not -- if there was a little gap shown there between those two on both sides and the same little gap shown between the magenta ink via and the heater array on both sides -- as long as that pattern was maintained, I mean, you would get this idea that, you know, this is the arrangement that he's describing.

Q. And I'm not suggesting that, you know, they're drawn to scale. Like you pointed correctly out, it's a schematic diagram. But I'm just confirming that it's your opinion that a person of ordinary skill in the art would understand that these spaces or the gaps between them aren't -- are meant -- convey some information in and of themselves to the skilled artisan.

A. Yes. They definitely convey some information. You know, the cyan heater array is getting its ink from the cyan ink via.

Q. And so I want to quickly turn to the next diagram -- next page.

MR. FORGHANY: The next one.

One more.

Q. And so looking at Figure 2, again, we've highlighted the vias here. If you go to page 6,

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starting with the -- Cell Number 1.

Again, we have the two sides. And, again, the gap between ink via 202 and heater array 210, that physical space -- white gap there and the distance between the two would convey to one of ordinary skill in the art that the magenta heater array is not disposed adjacent a longitudinal side of ink via 202, correct?

A. I'm trying to get to the same place you are in this document.

Q. It's being shown on the Zoom if it's helpful too.

A. Yeah. I'm not sure --

Q. Oh, it's too small?

A. It's kind of small, but -- so it's -- okay.

Q. Would you like me to reask my question?

A. Okay. So you -- okay. Yes, please. So this is Figure 2.

Q. Figure 2 but Cell Number 3. So on the cell that's all the way to the right, you'll see that the cyan and magenta heater arrays are both highlighted red.

And my question is: Would a person of ordinary skill in the art understand from looking at Figure 2 that the presence of a physical distance or a gap in -- symbolized by that white space between the cyan ink via and the magenta -- and the heater array

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that's labeled "210" -- because of that distance, it would not qualify or constitute a heater array disposed adjacent each longitudinal side of the cyan ink via.

MR. BORSOS: Objection to form.

A. I would agree with that. Also, the same comment I made in the previous one was that and they have the benefit of Figure 3 to show what is meant by adjacent --

Q. Right. And that's -- what's meant by adjacent would be what's shown as, you know, heater array 208 and how that's sharing a border with ink via 202. That would be considered, in your opinion, a heater array that's disposed adjacent a longitudinal side of an ink via, 202.

A. I can't see these numbers.

MR. FORGHANY: Michelle, can you zoom in on the figure that's all the way to the right.

Maybe just center it.

Q. Mr. Dietl, do you see the cyan ink via in the image all the way to the right? It's labeled "202."

A. I do.

Q. So my question is: Would one of ordinary skill in the art then know, similar to Figure 3, that Figure 3's placement of heater array 208 directly next to and sharing a border with ink via 202 shows that it

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is a heater array that is disposed adjacent a longitudinal side of ink via 202?

A. Yes. They would know that. But this isn't the exemplary embodiment here. Right? This is the --

Q. Yes.

A. -- prior art. Yeah.

Q. But they would -- a person of ordinary skill in the art would reasonably rely on the disclosures in the figures not for proportion purposes but just for relative positioning purposes.

A. Yes. I think this is a -- is meant to show relative positioning.

Q. What does the rectangular shape -- the long rectangular shape of the ink via suggest to you?

MR. BORSOS: Objection to form, asked and answered.

A. The ink via supplies ink to all the heaters in an array. Right? And so what it means is it's -- in this case, it's as long as the heater array so that the ink can get to each firing chamber and to each heater.

Q. Ink vias are normally in -- are normally symbolized or conveyed pictorially as, like -- as long skinny rectangles, correct? That's -- they commonly are used to -- they appear symbolically like that in schematics and diagrams.

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A. You know, not always. And sometimes, in some inkjet printheads, they're actually segmented. Right? And so there would be a series of shorter rectangles that make up the long. In some cases they're shown as, like, an oval, an oval shape.

Because during this period of time, some of the products -- the ink vias were sandblasted through the substrate, and it didn't create a real uniform rectangular-like shape for an ink via. It was more oblong or oval shaped. So --

Q. Would you agree that the traditional shape and more common shape out of the two would be the long skinny rectangle?

A. There was --

MR. BORSOS: Objection to form.

A. It was a mixture of both in the art.

Q. What do you mean by that?

A. Some of these patents --

MR. BORSOS: Objection to form.

A. Some patents show it as an oval, and some patents show it as a rectangle, and some patents show it as segments.

MR. BORSOS: I'd just ask, if there's an opportunity fairly soon, to take a break. I'd appreciate it.

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MR. FORGHANY: Yeah. Let me just finish this line of questioning.

If you could please go to the next slide.

Zoom out.

Next slide, please.

Next slide.

Next slide.

Next one.

Right.

Q. So if you look at Figure 2, you mentioned that...

MR. BORSOS: For the record, can we note that this is page 11 of 14 of Exhibit 4.

MR. FORGHANY: Yes. Thank you so much.

Q. We're looking at Exhibit -- page 11 of Exhibit 4.

And we were discussing the difference between the temperature sense resistor in Figure 1 versus the one in Figure 2 and the benefits that replicating -- or adding another temperature sensor in the manner shown in Figure 3 would add to the system.

And Barkley says in Column 2, as you pointed out -- you read this earlier into the record -- that "Monitoring and regulating the operating temperature on a per color basis by situating a temperature sense

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resistor on the same side of each ink via, as shown in Figure 2, is insufficient due to the fact that the heater arrays of more than one color now occupy the region between ink vias."

So my question is --

MR. FORGHANY: If you could scroll to the next slide.

Yeah. Right there. Perfect.

Q. How would this temperature sensor -- for example, if you were to add a cyan ink heater array between the cyan ink via and the temperature sensor, how does that temperature sensor now determine the temperature on a per color basis if the region is defined by two different color heater arrays?

MR. BORSOS: Objection to form.

A. So you have to go to my declaration where I added an illustration of what he was talking about in this section regarding adding another heater array as in Figure 3 but then another temperature sensor adjacent to that like you have here in Figure 2 on the magenta. Then there would be two temperature sensors in between the two vias.

And that is problematic in trying to measure temperature per color, because the -- if the magenta heater array is printing heavy color magenta and the

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cyan heater array in that same region is printing lightly, the cyan temperature sensor would get influenced by the temperature of the magenta heating and create an error. And that is what Barkley teaches about why -- why you can't control well by color and it's preferable to control by region with one sensor.

Q. So it's your opinion that Barkley acknowledges that his invention is meant to control the temperature by region and it cannot control temperature by color.

A. What he's saying is he's not controlling by color because the color is on both sides of the via. And so he controls by region, and that controls the two colors that are in that region in the center of the die or the one color that's in that region between the edge of the die.

Q. I see.

So you're interpreting Column -- that sentence in Column 2 as suggesting that Figure 2's solution is unique to -- is basically an approach for controlling temperature on a per color basis that wouldn't -- and that per color approach wouldn't apply where the -- there's two different color heater arrays in between the two vias. You're not suggesting that Barkley's invention somehow also manages to control

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temperature on a per color basis.
MR. BORSOS: Objection to form.
A. Barkley is saying that it's more advantageous to control temperature in a region on a per region basis than by trying to add another temperature sensor in that region and try to measure and control temperature on a per color basis.
Q. That's only -- it's only more advantageous where you had two heater arrays -- one heater array on each side of the via. Correct? Otherwise, it's more advantageous to do -- it might be -- it might not be more advantageous to have it on a per region basis.
A. Well, in that second case that you just had, per color and per region end up being the same, don't they? Like in Figure 2. So this is really specific around having heater arrays positioned on both sides of a via --
Q. Exactly.
A. -- and therefore, when you have two heater arrays in a region, Barkley is saying that it's preferable to control that with one temperature sensor centrally located -- substantially centrally located so that just controlling by the region is good enough and doesn't -- and gets out of the problem of unwanted errors that you would get when you have two sensors.

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MR. FORGHANY: And then now -- I think now is a good time to take a break. I don't think I've -- I'm nearing the end anyway.
So do you mind if I take a 15-minute break, Mark, now just to, like, go over my outline and we touch base again at 3:15 my time?
MR. BORSOS: That's fine with me.
Let me just ask. Mr. Dietl, you don't have any trouble with continuing on a bit longer, right? We're at the time period where we thought we'd be ending, but I just want to make sure we're not interfering with your schedule.
THE WITNESS: Yeah. What's a bit? What's --
MR. FORGHANY: I think another 45 minutes, an hour max.
THE WITNESS: Okay. I'm okay with that.
MR. FORGHANY: Thank you.
(Off the record: 3:01 p.m. to 3:17 p.m.)
Q. Mr. Dietl, we're referring to what's been marked as Exhibit 4 on page 12.
And do you recall that prior art system you referred to earlier that you mentioned, at least one system you're aware of that met the 1200 dpi or better vertical resolution? Do you, by chance, remember who manufactured it, if not the name?

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A. What I was thinking about was Kodak.
Q. When you were at Kodak, you remember working on a device like that?
A. Yes, I do.
Q. So -- and that was around what time frame?
A. It was introduced in 2000- -- middle of 2004.
Q. And so one of skill in the art, then, would have achieved -- would have known that they could have achieved that printing resolution by adding heater arrays on both sides of the ink via?
MR. BORSOS: Objection to form.
A. Yes. I think that was something that was known in the art even when it was 300 dpi printing to get to 600 dpi printing.
Q. And so my -- do you happen to -- by looking at the Figure 2 system or how it's described in -- by Barkley, do you happen to know what the Figure 2 system is capable of printing based on its arrangement?
MR. BORSOS: Objection to form.
A. I don't. Barkley implies that the -- that they could only get to 600 dpi in the Figure 2 system.
Q. Right. It says that it might -- may have, quote, significant difficulty providing ink drop sizes that are less than 4 picoliters while achieving a vertical resolution of about 1200 dpi.

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So is it fair to say that necessarily Barkley suggests that it was less than 1200 dpi?
A. Yes. That's what I would interpret. Yes.
Q. And so one of skill attempting to, for whatever reason, improve the Figure 2 system, let's say -- let's turn to Figure 2 -- and reach 1200 dpi, they would have done so, for example, by adding a second heater array -- or adding one heater array on each of the sides of the ink via shown in Figure 2. That would have been one of the options they would have, like, tried to do first or turned to first given the --
A. Yes.
Q. -- given the knowledge.
A. That's one --
MR. BORSOS: Objection to form.
A. That's one way. They might also keep the heater array on one side of the via and use the staggered nozzles approach, which was used in some designs, so that the distance between the via and the heater was not the same for every nozzle. Every other nozzle was -- or sometimes in groups of four they had different spacings away from the via that allowed them to use trigonometry to get more space between -- physically between the heaters and allow them higher density. But I don't know --

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Q. Right.
A. I don't know if that was -- at that time frame was achievable, 1200 dpi.
Q. Using the staggered approach.
A. Yes. I don't recall.
Q. So you're not aware of a product that used the staggered approach to achieve the 1200 dpi -- not to say that one didn't exist, just that you don't recall one because you didn't work on one.
A. I just don't recall. That's correct.
Q. Got it.
And so if one of ordinary skill in the art would turn to the approach of putting a heater array on each side of the ink vias on the -- and would modify the Figure 2 system in that manner, then isn't it true, then, that, for example, the cyan ink via would have a heater array positioned between itself and what's shown in Figure 2 as a temperature sense resistor on 222?
A. I think it's probably easier to look at Figure 3 --
Q. I just want to look at Figure 2 for the purposes that we know that that system was in the prior art because it's labeled "prior art."
And so my question is: A person of ordinary skill in the art who is working in the prior art time

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period, when they go and they implement this modification to achieve 1200 dpi and they went and put a heater array on each side of the ink vias, what ends up resulting is a heater array filling the gap between the cyan ink via and the temperature sense resistor 222 and another heating array that fills the gap between the magenta ink via and the temperature sensor resistor at 224, correct?
MR. BORSOS: Objection to form, mischaracterizes testimony.
A. So if you were to take this device and try to do pitch doubling to add -- to double the resolution, you would put the cyan heater array -- another cyan heater array on the right side of the cyan ink via. You'd put another magenta heater array on the right side of the magenta ink via, and you'd put a yellow heater array on the right side of the yellow ink via.
Q. Right. And so -- and that would be the -- that would be what they would -- you called it double pitching? What was the terminology you used?
A. Pitch doubling.
Q. Pitch doubling. Is that correct?
A. Yes. I thought I --
Q. Oh, sorry. I didn't hear you.
A. Yeah.

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Q. And so if we just go to -- for the purposes of our discussion today -- one minute.
The chat thing is really unfortunate. Thank you for your patience.
And looking at Figure 2, the temperature sense resistor, where -- based on how it's depicted in Figure 2, is it fair to say that the temperature sense resistor is being positioned somewhere in the center of -- somewhere near the center of the region that's defined by the two thermal barriers of cyan --
MR. BORSOS: Objection to form.
Q. -- cyan ink via and magenta ink via?
A. In Barkley '708, they talk about the -- you know, if you have it substantially centrally located, it's better in order to measure the average temperature of the region representative of those two arrays.
Q. Right. And I'm asking -- but that's referring to, like, the patented invention, correct, that part of Barkley's disclosure?
A. That's correct. Well, that's what we know about.
Q. It's not using that language to describe Figure 2.
A. No. That's -- no --

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Q. Right.
A. It's just easier for me to answer non-hypothetical than hypothetical.
Q. Right. No, and I'm -- so if Barkley disclosures about the -- substantially, you know, central to the region, the textual disclosures that it has in the '708 patent, those were all being -- referring to, you know, Figure 3 and 4 and 5 and the patented invention, and Barkley, however, also discloses -- you know, the only other figure where a temperature sensor is shown, you know, in a region is Figure 2, and while Barkley is silent on, you know, like, whether or not that is -- in the text about it being centrally disposed, my question is: Does the figure inform a person of ordinary skill in the art's understanding about where the temperature sense resistor would likely be positioned relative to the two ink vias?
MR. BORSOS: Objection to form.
A. Yeah, I really don't think so. I don't think that that's what he was trying to communicate with the figure.
Q. So would you agree that the figure is showing the temperature sense resistor in what would be near the center point of the region between the cyan ink via and the magenta ink via? That's where it's depicted.

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A. Yeah. But I don't think that that's physically what he was trying to show.
Q. You mean that it was --
A. You have to --
Q. -- it was inadvertently done.
A. Correct. I think that --
Q. Why do you think that?
A. Because it's -- a heater array takes up maybe 120 microns, maybe up to 200 microns. Right? And the driver electronics are much larger than that. And so this isn't intended to be proportional in size. The heater arrays are much narrower than the via, but it's not shown that way. So it's -- I don't think this is intended to be proportional or spatial in this view, that that thermal sense resistor is supposed to be in the center in this view.
Q. Right. No, and I understand that it's not supposed to be proportional. Right? And I think we're both in agreement there.
But it could be -- I thought before you mentioned that -- you described the diagram as having components that were positioned relatively -- relative to each other is what was intended to be conveyed through the diagrams.
A. Yeah, position in order, but not -- you know,

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not --
Q. The sequence, you're saying, not distance.
A. Not dimensional. Right? Not dimensional. And I think that, in a functional sense, silicon is highly thermally conductive, and it would work in multiple positions across that range. If you position that temperature sense resistor in a range across there, I'm sure it would probably be adequate to control the magenta heater array.
Q. I think what you're suggesting is that it's just showing the relative order. So it's that, like, right after the cyan ink via, the next thing that would appear would be the -- you know, out of all the components that are shown would be the temperature sense resistor, and then after that would be the magenta heater array. Is that what you meant by that?
A. The other way around. Magenta ink via, then the magenta heater array, and then the temperature sense resistor.
Q. Sure. But the positioning of those components in the diagram, you're suggesting that Barkley has intended them to convey a sense of sequence.
A. Yes. You know, I'm not sure that he's intending that, but then I'm not sure that he's not. Right?

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Q. How about this? What would a person of ordinary skill in the art understand from the drawing? Would it be a sequence? Or would it be position?
MR. BORSOS: Objection to form.
A. It's order, and I don't think it's -- physical position is trying to be shown in this diagram.
Q. Why, then, would he bother to put spaces in between some of the blocks, 222 and 202, and not put spaces in between others?
MR. BORSOS: Objection to form.
A. I think what he's trying to imply is he's trying to get a temperature that's representative and important to the magenta heater array.
Q. And why would creating a gap between the two help convey that -- or it would be understood as conveying that by a person of ordinary skill in the art?
A. He's just --
MR. BORSOS: Objection to form.
A. He's just showing in that area of the magenta heater array. I don't think that there's any intention there.
And maybe it is. I haven't seen his design. Maybe there's something there where the magenta heater array is more biased -- or the temperature sensor is more biased towards the heater array, but I don't --

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from this diagram, it's not indicating its position, whether it's center or biased to the right.
Q. But would you -- even though it's not -- it would be difficult to know what he intended, isn't it reasonable to assume that a person of ordinary skill in the art could arrive at that conclusion that, you know, these gaps in distance -- in the diagram were intended to show position as well as sequence?
MR. BORSOS: Objection to form, asked and answered.
A. They could, or they may not. Right? I think a person having ordinary skill in the art could interpret it either way, that it's not important but the order is more important than the actual physical position.
Q. So my last question for this -- using these diagrams is --
MR. FORGHANY: I'm just going to put it in the chat. And, Michelle, can you just create -- mark this as its own file or exhibit. It's just a further annotation of Exhibit 4. Maybe you can just mark it as Exhibit 5 and put it up on the screen, please.
THE TECHNICIAN: It's still not in the chat -- oh, there it goes.
MR. FORGHANY: It's the wrong image. Let me

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just fix it real quick.
There we go.
(Exhibit Number 5 introduced.)
Q. So Exhibit 5 is looking at Figure 2 of the '708 patent. And on the left-hand side is the colored version that we were just looking at earlier where the temperature sense resistor is positioned between -- is colored -- the 222 one is colored green, and it's positioned in the region between the ink via and the cyan ink via. And we were talking about this pitch doubling.
Was that the correct term, Mr. Dietl?
A. I'm not sure. You'd have to ask the whole question. I'm not --
Q. Pitch doubling? Pitch doubling, was that the --
A. "Pitch doubling" is the term used when you have heaters positioned each on opposite sides of an ink via staggered by one-half of the pitch of the distance between heaters.
Q. Understood.
And so Exhibit 5, on the right-hand image is -- has now been annotated and dropped in. You see two big red blocks in the sequence between where you had testified, you know, the heater array would result upon

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pitch doubling occurring in the system.
And my question is: As modified to reach the 1200 dpi in the image on the right, Figure 2 now has a heater array on both sides of the cyan ink via and on the magenta ink via, as shown in the picture, correct?
A. I --
MR. BORSOS: Objection to form.
A. The image is not clear to me. I can't see -- the shaded images are too light. I can't interpret this.
Q. Oh. Okay. Sorry about that.
MR. FORGHANY: All right. Michelle, second chance. Let's see if it gets -- I get this right.
We'll mark this as Exhibit 6.
(Exhibit Number 6 introduced.)
Q. And would you agree, looking at Figure 6, that it depicts the arrangement that would result from a person of ordinary skill in the art implementing pitch doubling in the Figure 2 prior art system?
A. Yeah. It's not, you know, quite proportional and the like, but in the order it is. And it's -- if you look at the figure in the '708 patent, it's probably clearer, because I think they -- you know, they show that in Figure 4 in the '708 patent -- or Figure 5.
Q. Yes. And --

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A. Figure 5 in the '708 patent does a nice job of showing what that would look like with pitch doubling.
Q. And Figure -- referring to the Figure 2 illustration that's marked as Exhibit 6.
Now, admittedly, Barkley does not say that the Figure 2 system would be able to, you know, regulate -- how it would regulate, you know, the temperature when you have two heater arrays that are associated with two different vias in the same region. That's the part of the invention that he describes in '708, Figure 5.
And my question to you is: In that description in Figure 5 where he's -- where Barkley is describing, you know, the means in which one would -- could regulate and monitor the temperature with a pitch doubling arrangement, were those -- any of those methods or solutions involving novel manufacturing processes for the die or novel temperature sense resistors or components that were not in existence before the filing date of the patent?
MR. BORSOS: Objection to form.
A. You know, I don't think he specifies any novel temperature sensor construction. Right? So I would say that it's manufacturable given the technology

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known at the time.
Q. And so, for example, he talks about how the heaters may also be formed of other technologies besides thin film resistors, as are known to those of skill in the art. That's an example of what you're referring to, that these are -- that he chose one implementation of a resistor that was known technology. He did not -- a novel resistor was not invented by Barkley in order to, you know, more accurately sense the temperature with a pitch double arrangement.
MR. BORSOS: Objection to form.
A. So the first thing you said was, I think, the thin film resistor in terms of the heater. I don't think he disclosed that -- a novel heater in the '708 patent.
Q. I think you're breaking up my question.
THE REPORTER: Mr. Forghany, can you slow down for the court reporter, please. Thank you.
MR. FORGHANY: I'm sorry. I'm trying to get this done before 6:00.
Q. So in Column 4, Barkley -- line 55 of the '708 patent, Barkley says, quote, these thin film resistors may be formed of a variety of materials, including platinum, aluminum, alloys, and other materials. The heaters may also be formed of other

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technologies besides thin firm resistors, as are known to those of skill in the art.

And my question is: All those materials and thin film resistors, those were all conventional equipment that was known at the time of the filing of the '708 patent, correct?

MR. BORSOS: Objection to form.

A. Yeah. You know, I'm not sure if all the things that he listed there -- if they were actually commercialized, but they were certainly mentioned in various patents at the time as thin film material options.

Q. And Barkley doesn't describe a novel manufacturing method for the die that would be necessary to correct any errors in temperature sensing with a pitch double arrangement.

MR. BORSOS: Objection to form.

A. No, he does not.

Q. And is it your opinion, then, that the absence of that instruction suggests that one of ordinary skill in the art would understand how to implement Barkley's invention without the need of that instruction?

MR. BORSOS: Objection to form.

A. No. Because they would have to have built

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the device and run into the same problems that Barkley would have and been inventive enough to put that resistor and use it in a way that Barkley discloses. So it's not obvious.

Q. Oh, no. I think my question is a little bit different.

So given that Barkley doesn't take the time to explain, you know, how to implement a thin resistor in this embodiment, the absence of a detailed instruction of how to do that suggests that he considers that knowledge to be within the understanding of one skilled in the art, and so he doesn't need to spend -- spill the ink to explain it.

A. Right. He --

MR. BORSOS: Objection to form.

A. He describes the technologies available at the time that they were -- was available to them. So --

Q. And my question is: In this -- I'm showing in Figure -- in Exhibit 6 the temperature sense resistor that's labeled "222" between the cyan ink via and the magenta ink via in a highlight of green. This sensor senses the temperature of the region between the two -- via 202 and the via 204. It is incapable of sensing the region -- the temperature of -- on a per color basis even if it had implemented Barkley's invention, correct?

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MR. BORSOS: Objection to form.

A. I don't understand the question.

Q. As I was saying it, I was realizing that I should probably just refer to Figure 5 for this one.

MR. FORGHANY: Can we go to Exhibit 3, Figure 5 of the '708 patent.

Q. So if you look at the second temperature sense resistor, 542, is that temperature sense resistor sensing color -- sensing temperature on a per color basis? Or on the per region basis?

A. As Barkley describes it, he's using it to measure -- to sense temperature on a per region basis.

Q. And Barkley describes how even if you wanted to sense it on a per color basis and you tried to put two sensors, you know, next to each other in that region, one for each of the heater arrays, that it wouldn't be feasible, correct?

A. No. He didn't say that. He said it would be subject to error.

Q. Sorry. Subject to error. What does that --

A. Yeah.

Q. Would it be commercially feasible errors?

MR. BORSOS: Objection to form.

A. You know, I think it could be commercially feasible. It's just not desirable. You have those

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errors that you're going to have to deal with, and then you have additional bond pads and connections for heat -- for temperature sensors that are, as he would look at it, as redundant. Right? He doesn't -- he -- you know, bond pads cost money, and they go along with connections and wires and the cable, all that. So this also is a --

Q. But you also --

A. It's a good way to save money in die size and...

Q. And if the rationale for including it -- two sensors there in the first place was to be able to sense color -- or sense temperature on a per color basis, adding two sensors there wouldn't necessarily guarantee that you were accurately sensing temperature on a per color basis, correct?

A. Right. As he disclosed --

MR. BORSOS: Objection to form.

A. It would be subject to error.

Q. Now, for the temperature sense resistor that's shown as 550, could the metal runs of that temperature sense resistor -- could that be -- could that traverse over -- can the ink via essentially be traversed over by the metal runs or the TSR? Or is that something that you couldn't do?

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MR. BORSOS: Objection to form.
A. Are you referring to something in the figure?
Q. Yeah. So looking at 542, the second temperature sensor, presumably that temperature sensor has metal runs. And I'm wondering, from a layout perspective, would a person of ordinary skill in the art -- would they know that the metal runs couldn't traverse over the ink via? They had to be, you know, confined to that space you were referring to earlier between the via and the -- between the two heater arrays?
MR. BORSOS: Objection to form.
A. So there's many ways that the leads that connect to these temperature sensors could be run. I mean, you could just run it up in a U shape and back. Right? As -- or you could --
Q. What couldn't you do? Could you --
A. Well, I mean, what you said was --
Q. Could you traverse over --
A. You can't traverse over the ink via. No. That would be inappropriate. That would --
Q. Why?
A. Because the trace could -- would be broken. Right? It's a -- any electronics or metal that you put over the via would be disrupted and left as an open.

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Q. So essentially, you know, you could no longer achieve a shared thermal equilibrium temperature quickly in that region.
A. Well, it's --
MR. BORSOS: Objection to form.
A. It's kind of a ridiculous question. Nobody would do it. Right?
Q. And the sensor output would not reasonably represent the temperature at both the heater arrays anymore, right?
A. Well, the sensor would be inoperable.
Q. Yeah. So it wouldn't represent the temperature of both heater arrays.
MR. BORSOS: Objection to form.
A. It wouldn't represent the temperature of anything. It would be broken.
MR. FORGHANY: I'm going to -- Michelle, could you please publish as -- mark as Exhibit 7 the document I put in the chat. This will be the last one.
(Exhibit Number 7 introduced.)
Q. What I'm marking as Exhibit 7, US Patent Number 7,350,902 to Steven Dietl, et al., from your time at Eastman Kodak Company.
Please take a moment to review it just quickly. I'm just going to ask you some high-level

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questions about the figures, but if you need to review the entire patent, please take your time.
You've accessed the document, correct, Mr. Dietl?
A. I do -- I have accessed the document, and I'm running down --
Q. Just making sure. Take your time.
A. Yeah. I'm running down through the figures right now.
Okay. I'm not going to read -- take the time to read the whole thing. If I have to go back and ask you for time to read it, I will, but I --
Q. Could you describe what's being shown in Figure -- well, what kind of printer system is being depicted and described through Figures 2A through 3 -- 13? Is it a nozzle -- sorry -- edge shooter? A roof shooter?
A. It's a roof shooter design with multiple vias and pitch doubling with heater arrays situated on each side of each via with a -- and staggered with a pitch of -- with one-half of the pitch of the distancing heaters on one side. It is novel by the fact that it used two different drop sizes in the two parallel columns.
Q. And do you remember working on this patent?

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A. I do.
Q. Do you remember whether it was ever commercialized?
A. Yes. It was commercialized.
Q. Do you happen to recall the name of the product that was -- that practices the patent?
A. There was a lot of products that were using this silicon die, maybe up to 40 products.
Q. So you were platforming, as I learned today.
A. It was a platform. Right.
So it was the EasyShare line of printers, the Kodak ESP office line of printers. There was -- what was the name of that?
There was other lines and multiple models under each line of printers. There was a significant number of products --
Q. And the --
A. -- were produced using this.
Q. The die was one of those critical components that was being maintained and designed throughout multiple products?
A. Yes.
MR. BORSOS: Objection to form.
Q. And looking at Figure 2B -- or 2A -- I guess there's no -- yeah, either one of those -- what are the

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ink vias -- can you point me to the ink vias here?
A. So ink vias are -- it looks like they're labeled as 128 and 138.
Q. And that shape is consistent with the same shape as shown -- a long cylindrical version -- a long cylindrical shape, a rectangular shape, as the -- similar to the long rectangular shape of the -- let me just restart that -- start over with that question.
And you depicted and pictorialized the ink vias as a long rectangle with two long sides and two very short faces, which I believe you marked as 128 on the first one and 138 on the second one?
A. Yeah. They're not -- those aren't the faces. Those are the -- 128 and 138 are pointing to the vias themselves.
Q. Why did you decide to depict it as -- in this shape of a long skinny rectangle, each of the vias?
MR. BORSOS: Objection to form.
A. I think it's more schematic. In the end product there was some curvature on the ends, but for the most part, it was a long, straight, single slot in the device, I believe. I don't think we had any bridges in the center or anything.
Q. And you intended for a person of ordinary skill in the art to look at that rectangular shape and

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understand that that was symbolizing an ink via.
A. Well, with the help of the specification.
Q. So you could have chosen --
A. Right? You know, you have to look at the images and then look at the specification and say "Okay. This is what 128 is and 138 is defined in the specification." So it's --
Q. But you --
A. -- it's called a fluid --
Q. Sorry.
A. It's called fluid delivery slot 128 and fluid delivery slot 138. So from that, I would expect a person having ordinary skill in the art to understand that that's an ink slot or an ink via.
Q. Because an ink slot is pictorially represented in the shape of a long skinny rectangle. That's what a slot is.
MR. BORSOS: Objection to form, asked and answered, mischaracterizes --
A. Not always.
MR. BORSOS: -- testimony.
Q. I'm wondering, like, did you not intentionally choose the long skinny rectangle? Was that just inadvertently you just landed on this shape for the via?

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A. Well, it's --
MR. BORSOS: Objection to form.
A. It's a schematic diagram. It's easier to draw a rectangle than getting into little details of corner radii or anything like that. It was filed -- the patent -- the architecture was envisioned, and the patent was filed before the final product was completed. Right? So it is not intended to represent sharp corners and in the corner or anything like that. It's intended to indicate that it's a slot for ink to come up through the silicon substrate and feed two arrays of heaters.
Q. And you also -- what are those circles representing on each side of the slot -- on the ink slot?
A. They're nozzles.
Q. And there's an array of nozzles or a row of them on each side of the via, but they're just off that to be pitched a little bit higher up the -- I don't know if "higher" is the right word -- but positioned offset -- in an offset manner on one side of the via than the other. Is that correct?
MR. BORSOS: Objection to form.
A. As I described pitch doubling, right, that each side is -- the array is offset by the distance of one-half the pitch of the nozzle -- difference between

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the heaters on the other side.
And this design basically has pitch quadrupling. Right? Because the next row is offset by a quarter of that pitch between heaters --
Q. So my question is --
A. -- although it's not the same -- it's not the same color.
Q. And my question is: You know, in your Figure 2, a schematic where you elected to graphically represent the ink via as a long rectangle, you also graphically represented the position of the nozzles in an offset manner in relation to each other. Even though they're not drawn to proportion, you intentionally showed them offset positionally from one another in relation -- in -- to the ink via, correct?
MR. BORSOS: Objection to form.
A. They're shown to be offset from the pitch on one side of the ink via versus the pitch -- the position on the other side of the ink via. I don't think they're really intended to be off -- shown to be offset in respect to the ink via. Right? The --
Q. To each other, yes. But they're --
A. -- schematic. Yeah. But's it's --
Q. Yeah. But the --
A. -- heater array to heater array or nozzle

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array to nozzle array. It's intended --
Q. Right. The presence of the ink via just helps illustrate that they're off center.
MR. BORSOS: Objection to form.
Q. And so earlier we were describing how -- we were discussing how, in your opinion, one of ordinary skill in the art would look at, you know, Figure 5 or Figure 2 or Figure 1 of the '708 patent, and you thought that a person of ordinary skill in the art could reasonably interpret the location of the different, you know, callouts of depicted ink vias and heater arrays as being just a disclosure of in sequence. And you said also that you could -- someone might interpret it as being -- you know, also having positional disclosures as well. Does --
MR. BORSOS: Objection to form.
Q. Is Figure 2A an example of how a person of ordinary skill in the art would have expect- -- would have read a positional disclosure from your -- from Figure 2A of the '902 patent?
MR. BORSOS: Objection to form.
A. I think they would have interpreted the position of the ratios of these staggers as it's spelled out in Figure 2A. Right? That there's a pitch doubling and then the other via and two arrays of nozzles are

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then offset from that by another -- by a quarter of the pitch.
Q. And you depicted the offset nature of them by putting a white space where it would originally have been if it had not been offset.
MR. BORSOS: Objection to form.
A. I don't know what you mean by that.
Q. So if it was not offset, there would be -- everything would shift down, and it would be in line with -- each side of the nozzles would be, you know, in the exact same position facing each other, not offset. But when you've offset them, the resulting depiction shows a white blank spot where the nozzle would have otherwise been.
MR. BORSOS: Objection to form.
A. Okay. I think really -- that's not -- this schematic, I don't think there was a lot of focused attention to that, leaving a blank spot. But I think --
Q. You did not add anything to suggest that -- in this drawing to suggest that you've moved -- you've positioned it differently or that there's been some positional change. You've just drawn it and then left it blank where it was blank.
A. It's, you know --
MR. BORSOS: Objection to form.

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A. We were careful to show this P/2, P/4 relationship between these -- between these nozzle arrays.
Q. And I want to talk about those. Because the second -- the second arrays, the nozzles are smaller. Is that what you intended to -- what were you intending to depict by having the circles be smaller in circumference than the ones in the via 120?
MR. BORSOS: Objection to form.
A. We were intending to show that the nozzles in the right -- that are surrounding the right-hand via were smaller nozzles than the nozzles in the left-hand via.
Q. So you -- in this illustration, you're depicting the spatial distance between nozzles by offsetting some, and you're also depicting the difference between the nozzle size circumference in the -- in Figure 2A, correct?
A. Yeah. Diameter is usually what's important is how it's -- nozzle diameter. So nozzles of the second nozzle array have a second opening area. Right? So...
Q. And you -- in both of these instances, you're depicting the nozzle arrays 120, 130, 140. They're all drawn very close to the ink via edges 129 and 139 and

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ink feed slot 128, 138, 148. That was also intentional, correct?
A. I don't know if it was precisely proportional. I don't recall. I don't --
Q. But --
A. -- think so.
Q. -- they're here very close to your order on the ink feed edge line. That was an intentional placement of the nozzle arrays in that location.
A. No. I don't believe so. No. I don't think that that would -- that's an accurate depiction that the --
Q. So --
A. -- the larger nozzles would be, like, touching up against the ink via. I don't believe that's an accurate depiction.
Q. Oh, no. My question is different.
I'm asking: You chose in both instances to have the nozzle -- the circles, you know, adjacent to the ink via, like near it, like right next to it. Maybe not on top of the line, but it's near it. You did not depict them as being, you know, on the other side of the -- in the middle between, like, the ink via and the edge of the silicon. You chose to depict them near each other not having a substantial gap and space between the

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two, between the via and the nozzle.
MR. BORSOS: Objection to form.
A. Yes. And if you look at Figure 2B, that's probably -- you know, it looks like more care was taken in Figure 2B in showing the via 128 and 138 and the nozzles 130 that are relatively close to the via 138 and 120, which are pretty close. I think 114 and 115 are probably the heaters.
Q. And so if you had intended to put some distance and design the -- or to configure this arrangement in a manner that the nozzle arrays were actually some distance away from the ink feed slot, you wouldn't have depicted Figure 2B in that manner where the nozzle arrays -- in that position that's currently depicted in Figure 2B.
MR. BORSOS: Objection to form.
A. Yeah. I'm not sure --
Q. So --
A. -- I understand the question. I mean --
Q. That was a bad question. Let me rephrase it. You --
A. I --
Q. -- how Figure 2B was consistent with what's shown in Figure 2A.
A. It's probably a better representation than

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what's shown in 2A -- right? -- in terms of --
Q. How is it better? What is it doing better than Figure 2A?
A. If you look at the nozzles 120, they're over the heater, and they're not -- they're not right up grazing the 128 ink via. Right? They're farther away than that -- than they're shown in Figure 2A.
Q. And just for the record -- for the record, could you please identify on the -- by number the heater you're referring to?
A. So 114 and 115 are the heaters, and they're directly below the nozzles 120 and 130.
Q. And you said that was intentional.
A. Well, the heaters were definitely positioned directly below the nozzles in the -- yes.
Q. Oh, no. I meant that the drawing intentionally shows them being positioned there.
A. Yeah. You know, I don't know when these drawings were done in terms of the proportions of the final design, but it isn't -- you know, the final design was probably not hugely different.
Q. Yeah. And what I'm really getting at here is I'm trying to understand, you know, when a person of ordinary skill in the art would understand to -- it's okay to rely on, you know, the location and proximity of

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certain components in a schematic and when they can't. And it seems like in this example you've shown the nozzle arrays close to and adjacent to the ink via in 2A, and then -- by positioning them near the ink via, and then that's corroborated by the fact that in Figure 2B they're also intentionally shown as being in a consistent sequence and proximity to the ink via and the heater.
MR. BORSOS: Objection to form.
A. You know, I think that the depiction here was not intended to be precise about the distance of these heaters in respect to the ink via or from heater 120 on one side of the via to heater -- or nozzle 120 on one side of the via to nozzle 120 on the other side of the via, that distance. The important thing that was trying to be portrayed here was how they're offset by proportions of the pitch between nozzles, and I don't think anything in this patent drives an importance around the other dimension the other direction. It's just --
Q. Right. And I --
A. -- what's important.
Q. Right. And I think that we're in agreement that a person of ordinary skill in the art would not look at dimensions or try to figure out the exact

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distance that a component needs to be based on the fact it's a schematic and a diagram. I'm more asking about the relative position and what would -- what they would understand to be, you know -- how that would operate in conjunction with other components that are depicted.
So, for example, by depicting -- what a person of ordinary skill -- would you think it was fair to say that a person of ordinary skill in the art looking at Figure 2A and the depiction of the nozzle adjacent to the ink via -- that they would understand that the ink edge arrays -- sorry -- that those rectangles would include the appropriate ink feed slots like a conventional roof shooter design practice so that they could achieve, you know, practical drop firing sequences? They could basically operate with the ink via.
MR. BORSOS: Objection to form.
A. I don't think there was any intention of trying to show that in this diagram.
Q. Not intention, but would it be fair to assume that a person of ordinary skill in the art would understand that -- from that drawing that the two -- that the ink feeds -- that the rectangles have an ink feed slot that works with the -- that is operationally associated with the nozzles?

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MR. BORSOS: Objection to form.
A. A person having ordinary skill in the art would know and would be able to interpret from these drawings that the ink feed slot is where ink is fed to the nozzles into the firing chambers of this device. And that's very -- that's standard in a roof shooter.
Q. And what about Figure 2A would make someone understand that?
A. I don't think --
MR. BORSOS: Objection to form.
A. I don't think 2A does show you that, because it doesn't show you the firing chamber. Personally, I don't recall this exactly, but I'm guessing that in a way we actually exaggerated the diameter of the nozzles 120, because we were trying to make a point that they were different, but in practice, they're not that different, and that created maybe an anomaly that you're trying to push at. I don't know.
Q. No. I'm just trying to understand how this is similar to -- how a person of ordinary skill in the art would interpret lines on a drawing in the '708 patent. And I understand that it's your opinion that a person of ordinary skill in the art would not pay -- give any heed to the exact proportions and dimensions of these -- of what's being shown here.

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But in the '708 patent, you testified that a person of ordinary skill in the art would understand that there would be chambers in the traditional heater chip, as depicted in Figures 1 and 2, just based on the fact that there was this rectangular shape that had the words "ink via" on it. And I'm wondering. Is your opinion different for the '902 patent? You're saying that a person of ordinary skill in the art would interpret that differently for the '902?
MR. BORSOS: Objection to form and misstates testimony.
A. I think that when a person reads -- a person having ordinary skill in the art reads the patent -- reads a patent, they do so in context of what's being taught. Right? And they're not -- they're not looking for precise conclusions around the positions of things in a dimension that the patent is not really even talking about.
And so in the '708 patent, the -- what's being taught is how to control -- how to sense temperature on a per region basis between heater arrays that are adjacent to ink vias and between two adjacent parallel ink vias. And so that's what -- because of that context, they're going to interpret those -- the drawings in '708 and how it -- what it teaches about

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that.
In this patent, the patent is teaching that you can improve print quality and get a certain improvement in productivity by staggering the nozzles in the vertical direction by pitch over 2 per via and then also have another -- have the two nozzle arrays have different nozzle diameters or nozzle area to produce different spot size and so to focus on that.
Q. Could you look at Column 6, line 43, of your patent. If you want to just quickly maybe read that column just so that you have the benefit of the entire text.
Let me know when you're finished.
A. I'm reading down to Count 7 to get to the end of this paragraph. It's a long paragraph.
Q. Yes. Thank you.
Just -- line 20, I think, is all I'm going to be -- that would be necessary -- actually, maybe 25, just related topically.
A. Okay.
Okay.
Q. So starting on Column 6, it says "Fluid delivery slots 128 and 138," which we equated as being -- to be another term for ink vias. And it describes how they're extending through the length of

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the substrate in the X direction.
And then "Each slot thereby forming a channel to supply fluid to the nozzles arranged along its respective length."
So in this instance in the patent, the -- your disclosure in the specification, in the text, is identical to what's being drawn in the Figure 2 where you're showing that the nozzles are extending along the length of the fluid slots onto -- in the same direction you're describing in the text, and they're forming a channel, right?
A. Yeah. Yes.
Q. And you're also showing that, just like the text -- it describes how the nozzles are broken up and arranged into two groups. You similarly break up and group them visually in the -- in your schematic diagram as well.
MR. BORSOS: Objection to form.
Q. Correct?
A. Yes. That's correct. The...
Q. And just like in the text where it describes how the nozzle array is spaced apart from the nozzle array 130 in the Y direction, Diagram 2A also shows that same array spaced apart in the same Y direction.
MR. BORSOS: Objection to form.

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Q. Did I miss your answer? I'm sorry.
A. Yeah. I'm reading -- you're not reading it verbatim, and so I'm reading along to see what it actually says.
Q. Oh, sure. I can quote verbatim.
A. "Nozzle array 120 is spaced apart from the nozzle array 130 in the Y direction."
Yes. So that --
Q. And --
A. As is the via, the slot.
Q. And just like Figure 2A, Column 6A, the next sentence says that the nozzle array are shown to be arranged in a straight line in the Y -- x direction. So you also intentionally drew them in a straight line in that figure.
A. And --
MR. BORSOS: Objection to form.
A. And that's correct. But then it also says they could be staggered.
Q. Right, in a sawtooth pattern.
A. A sawtooth pattern, yes.
Q. And it says "Generally speaking, the nozzles are arranged along the fluid delivery slots substantially in a straight line in the X direction."
What did you mean by that sentence, generally

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speaking?
MR. BORSOS: Objection to form.
A. I think what we meant by that line is that it's desirable to arrange them in a straight line along the X direction if you can. But if you can't, then you might have to use a sawtooth pattern. I think that's kind of what that line is -- how I would interpret it at this point.
Q. The use of the word "Generally speaking, the nozzles are arranged," that suggests that there's -- you're talking about, you know, how frequently they're arranged in a straight line versus a sawtooth one and that, as a general matter, they're much more frequently arranged in a straight line.
MR. BORSOS: Objection to form.
A. I don't think that frequency would be the right term I would use. They basically are saying they could be in a straight line, but generally speaking, I think you would prefer to arrange them along -- they're -- let me say this again.
They're saying in some applications, adjacent nozzles in each subgroup may be designed with a slight offset in the Y direction, for example, arranged in a sawtooth pattern. And then, generally speaking, the nozzles are arranged along the fluid delivery slots,

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substantially in a straight line in the X direction.
So what I think we meant by that -- I don't think it's a matter of, you know, out of 20 products 19 are going to be in a straight line. I don't think that's how it was at the time. But what I do think is -- it's saying is if you -- it's desirable to have them in a straight line if you can.
Q. Wouldn't it be the same as saying, generally speaking, you know, a football is brown but it could also be white?
MR. BORSOS: Objection to form.
A. I don't know.
Q. Isn't that suggesting that the more common or more conventional or more typical array -- you know, character -- way that it presents itself and so it's necessarily is tied to maybe a frequency and an appearance to the person with ordinary skill in the art?
MR. BORSOS: Objection to form.
A. I don't believe it's intending to imply that.
Q. That one is more common than the other. You're not intending that?
A. No.
Q. And so...
(Discussion off the record with the court reporter.)

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Q. On Figure -- on line -- Column 7, line 20, you say "In many applications, it is desirable to have the opening area of nozzles in groups 120a be the same as the opening area of nozzles in group 120b, but in some applications, it may be desirable to have nozzles in group 120a with different opening areas than those in group 120b. The same is true for groups 130a and 130b." Do you see that?
A. Yes.
Q. What did you mean by that and -- by that sentence?
MR. BORSOS: Objection to form.
A. I mean in an alternate -- it's meant to say that in an alternate embodiment, that the nozzles 120a and 120b, each on the side of the ink slot, could be different nozzle diameters. And the same with 130a and 130b.
And you can use this silicon chip in different applications for different purposes and get multiple drop sizes for color in this embodiment. Right? This alternate embodiment would allow you to have two different dot sizes on the page per color.
Q. And that's consistent with what you showed pictorially in Figure 2A, correct, that the nozzles could have different diameters?

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A. No. This is different. This is saying the nozzles 130 on each side of the same via would have different sizes on each side of this via.

So in the picture on the view here, it's up and down. On the patent, it's left to right. But -- you've got it rotated here. But if you look at where it's pointing to 130, the one on the bottom 130 would be a different diameter than the 130 at the top, and all those nozzles in the row on the top would be a different diameter than the row at the bottom.

Q. I'm sorry. You're looking at Figure 3? Or Figure 2?

A. I'm looking at Figure 2A.

Q. Yeah. I understand the -- 130a would be a different diameter than 130b?

A. Correct. That's what that paragraph says.

Q. But what is -- which one is shown in Figure 2A? Which of these -- is it the --

A. This embodiment -- this embodiment --

MR. BORSOS: Objection to form.

A. This embodiment is not shown in Figure 2A.

Q. But the -- so the sentence says that in many applications it's desirable to have the opening be the same, but in some applications the opening can be different. So isn't it true that in Figure 2 it's

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showing you the embodiment where they're the same diameter?

A. Yes. 2A is the embodiment where 120a and 120b are the same diameter.

Q. And you know that because they're drawn the same size.

A. Right.

MR. FORGHANY: No further questions. Thank you.

MR. BORSOS: Yeah, I'm not going to ask any questions.

THE REPORTER: Mr. Forghany, would you like to order the transcript?

MR. FORGHANY: Definitely.

THE REPORTER: Okay. And then I'll get you a rough in a few days.

MR. FORGHANY: Friday -- Saturday or Friday night would be good for, like, an interim one, and then the final could be next week.

THE REPORTER: Okay. What day next week would you like the final?

MR. FORGHANY: Thursday -- Wednesday, Thursday.

THE REPORTER: Okay. And, Mr. Borsos, any transcript for you?

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MR. BORSOS: Not for now. We'll make a decision on that.

(Proceedings concluded at 4:39 p.m.)

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CERTIFICATE OF SHORTHAND REPORTER

I, CRYSTAL HEREFORD NAME, certified shorthand reporter for the State of California do hereby certify:

That STEVEN J. DIETL, the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken before me and is a true record of the testimony given by such witness.

I further certify that the adverse party, PATENT OWNER, was represented by counsel at the deposition.

I further certify that the deposition of STEVEN J. DIETL occurred via Zoom videoconference on Thursday, December 21, 2023, commencing at 9:09 a.m. to 4:39 p.m.

I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

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IN WITNESS WHEREOF, I have hereunto set my hand this 28th day of December 2023.

Crystal Hereford

Crystal Hereford

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