

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3
4 BEFORE THE PATENT TRIAL AND APPEAL BOARD

5
6 JTEKT CORPORATION

7 Petitioner,

8 v.

9 GKN AUTOMOTIVE LTD.

10 Patent Owner,

11
12 Case IPR2016-00046

13 U.S. Patent No. 8,215,440

14
15
16
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18
19 The Deposition of JEFFREY L. STEIN,
20 Taken at 1000 Town Center,
21 Southfield, Michigan,
22 Commencing at 9:09 a.m.,
23 Wednesday, August 31, 2016,
24 Before Laurel A. Frogner, RMR, CRR, CSR-2495.
25

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17
18 ALSO PRESENT: MR. ERIC LAMOTHE
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21
22
23 * * * * *
24
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1 Southfield, Michigan
2 Wednesday, August 31, 2016
3 About 9:09 a.m.
4 JEFFREY L. STEIN,
5 having first been duly sworn, was examined
6 and testified on his oath as follows:
7 EXAMINATION BY MS. MANDRUSIAK:
8 Q. Good morning, Dr. Stein.
9 A. Good morning.
10 Q. How are you doing today?
11 A. I'm doing very well.
12 Q. Have you been deposed in the past?
13 A. Yes.
14 Q. Approximately how many times?
15 A. I don't know but certainly more than a couple of dozen.
16 Q. Okay. When was the last time you were deposed?
17 A. May or June.
18 Q. Of this year?
19 A. Yes.
20 Q. Okay. So I'm going to assume that you're very familiar
21 with the proceedings, and I'm just going to move forward
22 without going through the usual rigmarole. What did
23 you do to prepare for today's deposition?
24 A. I reviewed my declaration and exhibits to the
25 declaration, I reviewed the petition, and I have

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1 reviewed the exhibits to that petition, so includes the
2 Becker declaration and the response, patent owner
3 response and its exhibits. There may be some other
4 things but generally those are things I reviewed.
5 Q. Did you review the preliminary patent order response?
6 A. Specifically with respect to this deposition
7 preparation?
8 Q. Or ever.
9 A. I didn't see it for this deposition, and I don't
10 remember if I have ever seen it.
11 Q. Okay. Have you reviewed the decision from the Patent
12 Office instituting trial in this case?
13 A. I believe I have reviewed the institution decision.
14 Q. Okay. Who did you meet with in your preparation?
15 A. Ms. Shah.
16 Q. Anyone else?
17 A. Not -- no one else, no.
18 Q. Okay. Approximately how long did you meet?
19 A. We met yesterday.
20 Q. For the whole day?
21 A. Approximately.
22 Q. Okay. Have you ever worked with Ms. Shah before this
23 lawsuit?
24 A. Yes.
25 Q. Okay. Have you ever worked for GKN before this lawsuit?

1 A. No.
2 Q. Or this proceeding, excuse me. No?
3 A. (Witness shakes head from side to side.)
4 Q. Okay. When were you first engaged by Brooks Kushman for
5 this case?
6 A. I don't remember the precise date but it would have been
7 around the beginning of this year.
8 Q. Beginning of 2016?
9 A. Yes.
10 Q. Okay. Do you know if you did any work prior to the
11 preliminary response being filed?
12 A. I don't understand the question.
13 Q. Do you know if you provided any opinions or consultation
14 that went into GKN's patent owner preliminary response
15 in this case?
16 A. I don't know specifically what went into that response
17 so I don't know if that's true or not.
18 Q. Okay. Do you know that GKN disclaimed Claims 1, 4, and
19 5 in this case, in this patent?
20 A. Well, I'm not a legal person. I am generally aware that
21 those claims have been disclaimed, but I would have to
22 review, I believe it's discussed specifically in the
23 patent owner's response.
24 Q. Do you understand that the disclaimer means that GKN is
25 not disputing that those elements are taught by Teraoka?

1 A. Well, this copy of my CV is out of date so it has been
2 updated since this time. I've received awards, I have
3 many more publications, the testimony history would
4 certainly be changed.
5 Q. Any reason that you gave Ms. Shah this older version of
6 your CV?
7 MS. SHAH: Objection, assumes facts not in
8 evidence.
9 THE WITNESS: I don't know where this
10 particular copy came from.
11 BY MS. MANDRUSIAK:
12 Q. Okay. Of the things you mentioned that would be on your
13 updated version, is anything particularly relevant to
14 this case?
15 A. Well, I think that my CV in general is obviously
16 relevant to speaking about my experience and background
17 as to my expertise and the additional things that I have
18 done and that are on my updated CV, I certainly would
19 say are part of that picture.
20 Q. Okay. If you turn to Page 25, there's the heading
21 called Patents and Disclosures, and there is one item
22 listed there. Is that the only disclosure, invention
23 disclosure that you are associated with?
24 A. As I sit here now, that's all I can remember.
25 Q. So you're not a named inventor in any patents or patent

1 MS. SHAH: Objection as to form.
2 THE WITNESS: I'm not a legal person, and I
3 don't know what the disclaimer means legally.
4 BY MS. MANDRUSIAK:
5 Q. Okay. Approximately how much have you billed on this
6 case to date?
7 A. I'm pausing because I don't really remember what the
8 billing hours have been.
9 Q. Even ballpark is fine.
10 A. I would have to check my records, which I could do, and
11 provide you that information.
12 Q. You can't put even a ballpark number on it?
13 A. Well, what is a ballpark number?
14 Q. I mean is it 50 hours, is it 500 hours?
15 A. It would certainly be closer to 50 hours, but I think
16 that may be even not -- I don't know, I don't know.
17 Q. Okay. So I'm going to give you what has previously been
18 marked in this case as Exhibit 2033. Are you familiar
19 with this document?
20 A. Yes, it looks like a copy of my CV with my testimony
21 history from the last five years. I don't know when
22 this -- as of January 24, 2014.
23 Q. So that means your CV's about two and a half years out
24 of date. Is there anything you want to add to the CV or
25 that should be added to the CV?

1 applications?
2 A. Other than this one you mean?
3 Q. Has this invention disclosure been filed as a patent?
4 A. No.
5 Q. Okay. So are you a named inventor in any patent or
6 patent applications?
7 A. I don't believe so.
8 Q. Okay. From your CV, it's clear that you're a highly
9 experienced mechanical engineer. What areas do you
10 specifically consider yourself an expert in?
11 A. Well, I'm first and foremost a professor of mechanical
12 engineering, and I do research and teaching in
13 mechanical engineering, more specifically, systems and
14 controls engineering and modeling and simulation areas
15 within mechanical engineering, and design of mechanical
16 and electromechanical, hydro electromechanical systems.
17 So that general expertise then is applied to different
18 areas, but automotive engineering, transportation
19 engineering is the largest application of my skill sets
20 that I participate in.
21 Q. What does systems and controls engineering entail? Can
22 you explain that a little more, please.
23 A. We -- let me start over again. It's really the study of
24 the way components, mechanical and electrical and
25 hydraulic components interact with one another, how you

1 study those interactions, how you model those
2 interactions, how you simulate those models on computers
3 to help with the development of control strategies that
4 you might apply to these systems and, also, with how you
5 design the systems both -- well, just how you design
6 those systems as well.
7 Q. Have you ever helped develop any control strategies that
8 have been put into commercial application?
9 A. I guess I'd have to ask you to clarify what you mean by
10 put into commercial application.
11 Q. Well, so the work you just described, is that academic
12 and theoretical or has that ever been consulting for a
13 company, for example?
14 A. Well, the -- I would say that the ways in which that I
15 interact with industry, with government, with students,
16 with colleagues is quite complicated, lots of different
17 ways in which that happens, so your characterization of
18 giving me kind of binary opportunity in your question
19 is -- I don't think makes it possible to answer.
20 Q. Okay. So you said that you -- that the systems and
21 control engineering also involve simulating models to
22 help with design systems. What kind of design, like
23 what kind of systems have you modeled?
24 A. Well, for example, similar to the technology within the
25 440 patent, I have been involved in modeling powertrain

1 systems looking at the control of powertrain systems,
2 the design of powertrain systems and how they behave as
3 you change the control, as you change the design
4 parameters.
5 Q. Can you detail those projects a little more, please.
6 A. So I'm involved with the Automotive Research Center at
7 the University of Michigan, and in that context, for
8 example, we have -- in my lab I have been responsible
9 for the development of a modeling environment, software
10 environment for modeling powertrain systems in vehicles,
11 and we've used that on a number of occasions to do
12 studies to help the U.S. Army, to help some of the
13 automotive companies who are involved with the
14 Automotive Research Center with their design and of
15 their products.
16 Q. Okay. So when you're characterizing your expertise, you
17 broadly said systems controls engineering, modeling
18 simulation areas within mechanical engineering, design
19 of mechanical engineering, hydro mechanical systems.
20 Does that approximately summarize your statements?
21 A. Well, whatever I put on the record I would -- I don't
22 know if that includes all the things that I said.
23 Q. Okay. But so those are very broad categories, then you
24 would limit to automotive engineering, correct?
25 A. Then I would --

1 Q. Limit to automotive engineering, correct?
2 A. No, I wouldn't say that I'm limited to automotive
3 engineering, but that is an area that I have probably
4 directed more of my attention to and have more
5 involvement in than any other single application area.
6 Q. Okay. What other areas have you had experience in?
7 A. Manufacturing, manufacturing automation.
8 Q. Okay. Anything else?
9 A. I've also done some work early in my career on design
10 and control of prosthetic devices.
11 Q. Anything else?
12 A. Well, I don't want to, you know, bore you with a lot of
13 details. On the other hand, I don't want you to assume
14 that I've left out anything, either. I would consider
15 the work that I do on what I call internet distributed
16 hardware in the root simulation to be part of my
17 transportation work, but, strictly speaking, it has
18 broader applications than that, but it is one of my
19 areas of -- that I've worked on. That's in the system
20 controls design area, it's within this idea of modeling
21 and simulation except we try to implement these ideas
22 across geographically dispersed locations and use the
23 internet as a way of connecting these models that are
24 running at -- in geographically dispersed areas.
25 Sometimes we don't have models in these different areas,

1 but there will be a piece of hardware that's actually
2 connected to the computer.
3 So you could have an engine, for example, in
4 one location, you could have the drive train located in
5 another area, you could have a model of the vehicle in
6 yet a third area, geographically dispersed area, and you
7 could simulate the performance, test the performance of
8 the system, make design changes, and make control
9 changes, and see what the implications of that are. So
10 it's a growing technology that I'm involved in that
11 certainly has big implications for the transportation
12 industry but other industries as well.
13 Q. What about nonprofessionally, do you have expertise in
14 any other areas?
15 A. I guess I don't understand the question.
16 Q. Are you an avid golfer?
17 A. I know how to play golf, but I wouldn't say I'm avid nor
18 an expert.
19 Q. Any other hobbies or sports where you're particularly
20 accomplished?
21 A. I don't have anything in particular to relate.
22 Q. Okay. Let's give you a copy of what's been previously
23 marked Exhibit 2017. Are you familiar with this
24 document?
25 A. Yes, this is the declaration that I prepared in response

1 in this matter.
2 Q. Have you read this document in its entirety?
3 A. My declaration?
4 Q. (Nods head.)
5 A. I mean I --
6 Q. I hope it's yes.
7 A. I have obviously read this document, more than read this
8 document.
9 Q. When was the last time you've read it through?
10 A. Well, I guess I would ask you to rephrase the question
11 because I don't know what you mean by through.
12 Q. Okay. So I assume you studied this in preparation for
13 your deposition, right?
14 A. Yes.
15 Q. In your study last week or yesterday, did you come
16 across anything that you would like to change or correct
17 in your declaration?
18 MS. SHAH: Objection, assumes facts not in
19 evidence.
20 THE WITNESS: Well, I'm not sure what you mean
21 by change or correct.
22 BY MS. MANDRUSIAK:
23 Q. I mean did you come across any typos that you regret and
24 would like to note on the record?
25 A. I'm not aware of there being any typos, but there

1 certainly could be.
2 Q. Okay. So today you still agree with all of the opinions
3 in your declaration?
4 A. I think that I agree with everything that's in here. We
5 certainly can go through and discuss each and every one
6 of those.
7 Q. We certainly are going to.
8 A. So --
9 Q. So you're saying you might disagree as we go through one
10 by one?
11 A. No, I'm not saying I might disagree, but it may be that
12 when you're asking me a question about my declaration
13 that the way that I've written it has given you the
14 wrong impression, and I, therefore, will need to clarify
15 what I meant by what I've written.
16 Q. Okay. Can you please turn to Paragraph 5, please.
17 Okay. So the last sentence in Paragraph 5 says in
18 several of your research projects your students and you
19 discovered unique ways to model, design, and control
20 automotive powertrains including 4-wheel drive driveline
21 systems. Can you discuss those projects in a little
22 more detail, please.
23 A. So that -- this is included in some of the things I was
24 mentioning before when you asked about my expertise, I
25 was discussing some of the things that I have done and

1 in particular, so this paragraph fits in with those
2 things that I discussed before.
3 Q. What projects that you've worked on with your students
4 do you think are particularly relevant to the 440
5 patent?
6 A. Well, that's a difficult question to answer because
7 there are a lot of things about my background and
8 expertise that help me with -- over the years that help
9 me with the -- my ability to understand the 440 patent.
10 So I had, for example, students in the time frame of the
11 90s and, in particular, by 1998 so I know what kinds of
12 things we were working on then and what we were thinking
13 about then as opposed to my current students, who are
14 doing the things that have evolved since then. So
15 there's this evolution that is important to my ability
16 to think about the 440 patent.
17 Q. Okay. So you can't -- I understand what you're saying,
18 that makes perfect sense, but is there any particular
19 project where you think, yes, this was very similar to
20 the subject matter of the 440?
21 A. Well, again, I have trouble a little bit with what the
22 subject is of the 440 patent. The subject involves the
23 design of driveline systems, and that's a big subject
24 area, and I've done a lot of work in that area with my
25 students, and I think that my experience and expertise

1 that comes from those projects help inform my analysis
2 of the 440 patent.
3 Q. Can we talk about the projects in Paragraph 6, please.
4 You highlighted two with their titles in Paragraph 6.
5 Can you explain both of those projects a little more in
6 detail, please.
7 A. I found a typo and you asked me about before. There are
8 two projects there. It says that I'm the former PI of a
9 multi-scale design and control framework for dynamically
10 coupled sustainable and resilient infrastructures, with
11 application to vehicle-to-grid integration. I'll
12 explain that project first, which was a four-year funded
13 project from the National Science Foundation looking at
14 the design and control of hybrid electric vehicles in
15 the context of the effect that they have on the
16 transportation system and on the electric grid system or
17 infrastructure.
18 So when you think about how are you going to
19 design hybrid electric vehicles, how you're going to
20 control hybrid electric vehicles, how you're going to
21 charge hybrid electric vehicles, this, of course, has a
22 big effect on how they will operate within the
23 transportation system, but they also affect, because we
24 put -- charge them, it also affects what happens to the
25 electric grid. And so when you think about the design,

1 you need to think about what are the implications for
2 the design of the grid, the electric grid, as well as
3 the benefits you're trying to derive for the --
4 Q. Sure.
5 A. -- transportation system. So it's a systems level view,
6 you have a lot of complicated interactions, and these
7 are not predictable interactions, so you help try to
8 study this with models and look at the design and the
9 control aspects to try to help with figuring out what
10 would be the best way, what would be feasible ways, what
11 would be the best way in those feasible ways to design
12 hybrid electric vehicles, actually plug-in hybrid
13 electric vehicles, so vehicles that you charge.
14 Q. You said some of the interactions were not predictable.
15 What kind of unpredictable results did you find in this
16 study?
17 A. So predictable, what I mean by that is that we had to
18 use models of the vehicle, the charging, what --
19 charging those vehicles, how that would affect the
20 electric grid and as well as how it would affect, then,
21 the performance of the vehicle. So there are so many
22 things going on that you can't sit there beforehand and
23 say, well, if we just do this, it'll have the following
24 effect. It's too complicated. There are too many
25 interactions you don't know, so that's what I mean by

1 it's not predictable. So you can use the models to help
2 you predict.
3 Q. Okay.
4 A. And understand these interactions, and that's what we
5 do, that's what engineers do in general is to use models
6 to help understand how components interact and how,
7 therefore, to design these components, because they
8 can't foresee all these interactions just by sitting
9 there even by having experience with them in the past.
10 Q. How is that product or project related to powertrains or
11 is it not particularly related to powertrains?
12 A. It's related to powertrains in that part of our modeling
13 was to capture the powertrain of the vehicles that we
14 were trying to look at their design of, so it was in
15 this somewhat unusual context that we were asking to
16 look at it, because people hadn't looked at this large a
17 scale how it would affect the design of the vehicle, and
18 that's what we suggested we would look at.
19 Q. What about the second project in Paragraph 6, can you
20 discuss that in a little more detail, please?
21 A. Certainly, and the correction that I found is that I'm
22 no longer the PI because the project's expired so there
23 is -- I'm the past PI, I guess, of this project.
24 Q. Okay.
25 A. The project, yeah. So this is -- the project is called

1 Sustainable Transportation For a 3rd Century: An
2 Interdisciplinary Approach to Addressing the Last Mile
3 Problem For Enhanced Accessibility. So this was an
4 interdisciplinary project, as the title indicates, where
5 we were looking at the, again, the design of vehicles,
6 and this was a multi-investigator team, I was the PI and
7 I represented the expertise related to vehicle design,
8 powertrain design. And we were looking at the design of
9 and control of the vehicle in a context of addressing
10 looking at vehicles that were trying to help reduce
11 congestion in our cities, so we were looking at, well,
12 how are our cities going to evolve, what kind of
13 vehicles would we like to be used in, say, downtown
14 areas as opposed to going to the airport as opposed to
15 doing other kinds of activities, and if these vehicles
16 had kind of more specialized objectives, in other words,
17 if the vehicle was going to be used in a very specified
18 kind of way, then how would we evolve the design of the
19 vehicle, the powertrain of the vehicle, to be the best
20 vehicle it could be for that particular application.
21 Q. So the real purpose of that project was to design
22 powertrains?
23 A. Well, there were -- that's a -- the purpose of the work
24 that I was doing in the context of that, I was
25 responsible for the vehicle powertrain design, so I

1 guess that was my objective, but I did that in this
2 context with my colleagues who had other expertise.
3 Q. In Paragraph 7 you note that much of your work has been
4 in the automotive engineering field, and most of it is
5 particularly germane to the area of automotive
6 powertrains, and then you list some examples that
7 continue onto the next page. How is wireless ignition
8 modules particularly germane to powertrains or how are
9 wireless ignition modules?
10 A. So I would think that your question perhaps doesn't
11 reflect what I've written here exactly. It says that
12 much of this work in the automotive engineering field --
13 much of this work is in the automotive engineering
14 field, and most of it particularly germane to the area
15 of automotive powertrains. And then it talks about some
16 of the work that I've done, transfer cases for on demand
17 4-wheel drive, that's clearly powertrain related,
18 automotive and mechanical transmissions, that's clearly
19 powertrain related, hybrid electric vehicle design and
20 control, that's clearly powertrain, wireless ignition
21 modules and value added glass are vehicle related work
22 that I've done but I would say is not part of the
23 powertrain.
24 Q. Okay. In Paragraph 11 you state that you've authored
25 over 70 journal articles, including at least seven that

1 are related to powertrain design and control. If you
2 can turn back to your CV, can you point me to one or two
3 of the articles that you think are related to powertrain
4 design and control?
5 A. It would help if I got my CV out. So there are a number
6 of different articles here. I've spent a little bit of
7 time to try to find one that maybe is easier for you to
8 understand the connection between what I did in
9 powertrain control such as the Journal Article Number 54
10 by Ahlawat, Fathy, Lee, and Stein and Jung, Modeling and
11 Simulation of a Dual Clutch Transmission Vehicle to
12 Analyze the Effect of Pump Selection on Fuel Economy.
13 So there's another paper, 43, Filipi is the
14 lead author, F-i-l-i-p-i, and the paper is
15 Engine-in-the-Loop Testing For Evaluating Hybrid
16 Propulsion Concepts and Transient Emissions. So those
17 are two papers that are looking at powertrain.
18 Q. Okay. Are those papers related to designing a
19 powertrain?
20 A. Yes, they are.
21 Q. Okay. Please explain. The first one looks to me like
22 it's about measuring emissions, so were you --
23 A. The first one?
24 Q. Number 43.
25 A. Oh. We were looking at different powertrain concepts

1 for hybrid vehicles and looking at the effect that these
2 concepts would have on the performance of the vehicle,
3 and in this particular case the key concepts were we
4 were looking at transient emissions as one of the
5 important metrics for performance.
6 Q. Where did the different powertrain concepts come from?
7 A. I guess I'm not sure what your question is.
8 Q. You said you looked at different powertrain concepts, so
9 did you and your students devise five different
10 powertrain concepts and then model them or did you take
11 five existing powertrains?
12 A. I don't recall specifically. I know this was 10 years
13 ago almost, and I think what we were -- I think what we
14 were looking at was things that we had and others in my,
15 you know, in the field were talking about as potential
16 strategies, potential concepts for hybrid propulsion
17 systems, and we were looking at trying to see how these
18 different concepts affected transient emissions of the
19 vehicle.
20 Q. So the concepts already existed, the powertrain concepts
21 already existed?
22 A. Yeah. I don't remember exactly what the concepts were
23 that we were using, so I can't answer that sitting here
24 today precisely. I'd be happy to review the paper with
25 you.

1 Q. Do you remember if any of the powertrains were related
2 to 4-wheel drive vehicles?
3 A. I don't remember.
4 Q. Do you think it's likely that they were 4-wheel drive
5 vehicles?
6 A. I don't remember.
7 Q. Were there a lot of hybrid 4-wheel drive vehicles in
8 2006?
9 A. What do you mean were there a lot?
10 Q. I mean if you were talking about existing powertrain
11 concepts in 2006 of hybrid vehicles, can you name some
12 hybrid 4-wheel drive vehicles from that period?
13 A. I mean these are not necessarily -- I mean I can't
14 remember the specific design concepts that we tested in
15 that paper. So does there exist 4-wheel drive hybrid
16 vehicles, yes, concepts, yes.
17 Q. Okay. Let's talk about Article Number 54 a little bit.
18 Can you explain that project a little bit and how you
19 think it's related to powertrain design.
20 A. Well, this was about looking at the effect, as it says,
21 of a particular type of pump, we were looking at
22 different pump designs for dual clutch transmissions in
23 vehicles. And the idea was that these different pump
24 designs, I think there were two basic different designs
25 we were looking at, you know, as usual, there's

1 tradeoffs and there was the traditional pump that had
2 been used and there was a pump that was felt could do a
3 better job of -- more efficient, could do the job more
4 efficiently and yield slightly better fuel economy to
5 the vehicle through more efficient, less losses within
6 the powertrain, within the transmission in this case,
7 which was a powertrain component. So we were looking
8 at -- through simulation, modeling simulation, we were
9 looking to see whether or not it would really be
10 beneficial to go with this new pump design. And this is
11 what I was telling you before, it's, you know, it's not
12 predictable, you can't sit there and say, well, yeah,
13 it'll be better, you have to model it, simulate it, and
14 see if it does actually work better according to your
15 criteria, and that's what we did in this study.
16 Q. Do you recall the results? Did the pumps work better?
17 A. I don't recall the results precisely, I think there was
18 some mixed results.
19 Q. Do you recall if any of the vehicles you modeled were
20 4-wheel drive vehicles?
21 A. In this particular study?
22 Q. Yes.
23 A. I don't remember, but I don't -- I don't remember
24 whether the vehicle was 4 or 2-wheel drive.
25 Q. Okay. Are any of your publications related to drive

1 train disconnect as covered by the 440 patent?
2 MS. SHAH: Objection as to form.
3 THE WITNESS: Yeah, I don't really understand
4 what you mean by related to disconnect.
5 BY MS. MANDRUSIAK:
6 Q. You don't understand the concept of drive train
7 disconnect?
8 A. No, that's not what I -- I understand that the 440 has
9 as one of its features this ability to disconnect, shut
10 down a significant portion of the secondary drive train,
11 and for the purposes of improving fuel economy. So to
12 the extent that I have looked at fuel economy issues as
13 it relates to, for example, pump selection, I've done
14 things that are relevant to what is at issue in the 440
15 patent.
16 Q. Okay. So it's a pretty broad characterization of what
17 is relevant to the 440 patent if it's just anything to
18 do with fuel efficiency, right?
19 MS. SHAH: Objection, argumentative.
20 THE WITNESS: I was just using that as one
21 example of how your original question was confusing to
22 me and very broad, and so I answered it, at least that
23 was one answer I could give you within the broad context
24 of your question.
25

1 BY MS. MANDRUSIAK:
2 Q. How much of your work would you say has been directed to
3 powertrain design percentage wise over your whole
4 career? I understand this might be a tough number to
5 get at.
6 A. I don't really know how to answer that question. You
7 can see all the publications here that I've done, there
8 are -- many, many of them are in the transportation
9 area, a subset of which are in the powertrain area or
10 related to powertrain control design vehicle
11 performance.
12 So I don't know what number to give you.
13 Q. Okay. Well, let's look at the numbers that you gave
14 yourself in Paragraph 11.
15 A. Okay.
16 Q. So if 7 out of your 70 journal articles are about
17 powertrains, and that's 10 percent, and if 9 of your 125
18 refereed conference papers are about powertrains, that's
19 7.2 percent, if we add that all together out of your --
20 combining journal articles and conference papers we get
21 8.2 percent of your published work is related to
22 powertrain design. Is that you think commensurate with
23 your career overall?
24 A. Again, it depends on how broadly you want to cast that
25 blanket. As it relates to issues that I talk about in

1 my declaration, I believe that there are issues beyond
2 what are in those -- represented by the 8.2 percent
3 number you gave me or whatever the number was that
4 would -- that are relevant to my declaration, my
5 producing the declaration and understanding of the 440
6 patent and what it's trying to do.
7 Q. Are you familiar with the term person of ordinary skill
8 in the art?
9 A. Yes.
10 Q. Do you think you have more experience than a person of
11 ordinary skill in the art in this area?
12 A. Well, there is a definition for a person of ordinary
13 skill that's given, and I have more education than is
14 listed for that person.
15 Q. Have you ever been through the product development
16 process for an automotive 4-wheel drive commercial
17 product?
18 A. Well, I don't know what it means to be involved with or
19 what was the word you used?
20 Q. Product development process.
21 A. Yes, but could you repeat the question, please.
22 Q. Okay. So I'll repeat it verbatim, and if you can't
23 answer it, we'll try a different one. Have you ever
24 been through the product development process for an
25 automotive 4-wheel drive commercial product?

1 A. So if -- I think your question's ambiguous because I
2 don't know what it means to -- gone through the process
3 of, what does that mean?
4 Q. Have you ever been on a design team for a commercial
5 4-wheel drive vehicle?
6 A. Do you mean have I worked for, say, a supplier or OEM on
7 the design of their product that's going out the door?
8 Q. Yes.
9 A. No, I have not.
10 Q. Okay. Do you have any idea how long any change to a
11 commercial product like that would require to make it
12 into production?
13 MS. SHAH: Objection as to form.
14 THE WITNESS: Could you rephrase that
15 question, please.
16 BY MS. MANDRUSIAK:
17 Q. I think I'll just move on. If you have no commercial
18 experience, I can't expect you to really answer how long
19 it would take to design and put a commercial product
20 into production.
21 A. You asked me if I ever worked, meaning have I been paid
22 to do the design work for a company. I've been
23 connected with the automotive companies for years, have
24 been aware of development times, I have been aware of
25 development processes. I've had students go to the

1 automotive industry and work there. I've had students
2 in the automotive area come to my lab to continue their
3 education. And so I have quite a bit of familiarity
4 with development times and design processes. That's
5 quite a different thing than answering your question
6 before whether I had actually received money as an
7 employee of General Motors to design -- be on their
8 design team per se.
9 Q. So with your peripheral familiarity, what is your
10 knowledge of the development time for a component change
11 in the drive train of a commercial vehicle?
12 MS. SHAH: Objection as to form.
13 THE WITNESS: I'm not sure I would
14 characterize my connection as peripheral, but I'll
15 answer the question from my experience and knowledge of
16 the automotive industry, and it depends on how big a
17 change you're going to make in the -- in your system,
18 but new powertrain concepts take a long time to develop,
19 years is my -- would be my understanding of what it
20 takes.
21 BY MS. MANDRUSIAK:
22 Q. Let's turn to Paragraph 18 of your declaration. The
23 first sentence says that you understand a person of
24 ordinary skill in the art is one presumed to be aware of
25 all pertinent art as of the relevant time frame. What

1 does pertinent art mean?
2 A. Well, I think you're -- I don't know if you're asking me
3 to come to a legal definition of what a person of
4 ordinary skill in the art is or if you're asking me what
5 my -- the ordinary meaning of that word might be.
6 Q. I'm asking what you meant by using that phrase in your
7 declaration.
8 MS. SHAH: Objection, calls for a legal
9 conclusion.
10 THE WITNESS: As you can see, I started that
11 sentence with "I understand," meaning that this is what
12 was represented to me by legal team that I was working
13 with, in particular, Ms. Shah.
14 BY MS. MANDRUSIAK:
15 Q. So that phrase came from Ms. Shah, and you presumably
16 discussed it at some point, correct?
17 MS. SHAH: Objection, assumes facts not in
18 evidence.
19 THE WITNESS: This is -- I don't remember
20 specifically, you know, when I wrote this paragraph. I
21 don't remember how the choice of words precisely was --
22 were selected, but I do remember talking about this, and
23 I do recall the fact that this is something that I was
24 given an understanding of based on the fact that it's a
25 legal concept, and which is why I started the sentence I

1 understand that, and so I have an understanding of what
2 that means, but I don't know what it means legally since
3 I'm not a legal expert.
4 BY MS. MANDRUSIAK:
5 Q. Let's talk about it, then, from a technical point of
6 view. What types of references do you think would be
7 pertinent to the 440 patent?
8 MS. SHAH: Objection, it still calls for a
9 legal conclusion.
10 BY MS. MANDRUSIAK:
11 Q. Okay. I'll ask it a different way. Would a person of
12 skill in the art only read 4-wheel drive references or
13 would they be aware of 2-wheel drive references, also?
14 MS. SHAH: Objection, calls for a legal
15 conclusion.
16 THE WITNESS: I don't really understand what
17 you're asking me to opine on here.
18 BY MS. MANDRUSIAK:
19 Q. Okay. Maybe we'll revisit it when we talk about the
20 specific references, then.
21 In Paragraph 19 you talk about the date May 6,
22 2008. What's the significance of that date? Why did
23 you choose that date?
24 MS. SHAH: Objection, assumes facts not in
25 evidence.

1 THE WITNESS: So I see that this date in
2 Paragraph 19 of my declaration corresponds to the
3 earliest foreign application priority date.
4 BY MS. MANDRUSIAK:
5 Q. Okay. Let's turn to Paragraph 25, please, of your
6 declaration. The first sentence says it is also a well-
7 known principle that the 4WD system can be disengaged or
8 shut down. Can you explain that a little bit?
9 A. Let me do a little house cleaning here.
10 Q. Actually, what's in that binder I'll ask before we move
11 on.
12 A. This has my declaration and its exhibits, it has the
13 patent owner's response and exhibits, it has the
14 petition and some exhibits, and I think that's generally
15 it but --
16 Q. Are those your personal copies?
17 A. Yes.
18 Q. Do you have notes in any of those documents?
19 A. No.
20 Q. Okay. So we'll go back to Paragraph 25. Can you
21 explain that first sentence a little more, please.
22 A. So the first sentence in Paragraph 25 is a lead into a
23 paragraph in more generally my section on the state of
24 the art as of the relevant time frame under Subsection
25 A, drivelines in general, 2-wheel drive and 4-wheel

1 drive, and after talking about what a -- is the general
2 idea of a 4-wheel drive system, I start off this
3 Paragraph Number 25 that it was well known that if you
4 disengage -- it's a well known principle that you can
5 turn off the 4-wheel drive system, you can disengage it,
6 you can shut it down, and I say that in the next
7 sentence that in so doing, one of benefits is that you
8 can save fuel.
9 Q. Do you have a citation for those concepts or is that
10 based on your experience and expertise in this area?
11 A. While I didn't provide a citation on this particular
12 sentence, it's certainly I would say a well understood
13 idea at the time of the frame we're talking about here
14 that 4-wheel drive systems can be engaged or disengaged,
15 that they are usually designed so that they can be
16 engaged or disengaged, and that one of the advantages of
17 disengaging a 4-wheel drive system in a vehicle is that
18 you can save fuel.
19 Q. So you would agree that it's reasonable for an expert to
20 rely on their expertise rather than provide citations
21 for well understood concepts?
22 MS. SHAH: Objection. Objection, this has
23 nothing to do with this case, the purpose for being
24 here.
25 BY MS. MANDRUSIAK:

1 ready, willing, and able to give you a citation to
2 support that. In fact, I'm sure that the exhibits that
3 I have, the Borg Warner, for example, materials that
4 talk about the history of 4-wheel drive, I'm sure, talks
5 about selecting and disengaging 4-wheel drive systems
6 so.
7 Q. That's fine. I'll take your word for it. Why don't we
8 take a break, maybe 10 minutes, and come back.
9 A. Certainly.
10 (A recess was taken from 10:30 to 10:42 a.m.)
11 BY MS. MANDRUSIAK:
12 Q. Okay. Let's turn to Paragraph 32 of your declaration,
13 please.
14 A. Paragraph 32?
15 Q. Paragraph 32, yes.
16 A. I'm going to Page 32. Okay.
17 Q. Do you ever mention cost in this section on designing a
18 driveline?
19 MS. SHAH: Objection as to form.
20 THE WITNESS: So could you rephrase your
21 question, please.
22 BY MS. MANDRUSIAK:
23 Q. Do you mention cost in your section on designing a drive
24 train?
25 A. Well, I'm not sure what you mean by that. It certainly

1 Q. You can answer.
2 A. Would you rephrase the question, please.
3 Q. So you just explained that you didn't provide a citation
4 because it is a well understood fact back in -- or at
5 the time that a 4-wheel drive system can be shut down.
6 So I asked whether or not you would agree that it's
7 reasonable for an expert to rely on their expertise
8 rather than provide citations for well understood
9 concepts?
10 A. Well, I can't speak about the legal requirements for
11 experts. I used my own judgment when I felt I needed to
12 use a citation and when not, and if something is very
13 well understood and not in dispute, and perhaps other
14 criteria as well, as in this particular sentence, I
15 didn't feel a need to provide a citation, but for a host
16 of other reasons, one might be required to provide a
17 citation, it may not be sufficient to just rely on one's
18 own expertise. If there is something that's in dispute
19 or a variety of other conditions, then I might, even if
20 I feel like it's a well known principle, I might in that
21 case actually provide a citation because of that, a lot
22 of other factors. So it's not just a simple
23 determination.
24 Q. So a judgment call in this instance?
25 A. This was my judgment in this case, and I am certainly

1 is a section which goes into a fair amount of detail
2 about the fact that there's a lot of tradeoffs to be
3 considered in the design of a powertrain system, and it
4 goes through and talks about those, about those
5 tradeoffs, and it -- clearly there is this idea in this
6 particular section that this is a complicated area in
7 mechanical, electromechanical design, in vehicle design,
8 and there are a lot of tradeoffs to be considered, and I
9 don't pretend necessarily to elucidate every constraint
10 that has to be considered, but I certainly have provided
11 an accounting of a number of them.
12 Q. So you would agree that cost is a constraint for real
13 world applications of powertrain design?
14 A. Of course, when you're designing and selling a product,
15 you have to consider how much that -- how much that
16 product is going to sell for and how much it's going to
17 cost you to design and make the product, and, of course,
18 that's a complicated -- well, I'll just leave it that it
19 is certainly a consideration.
20 Q. Okay. How about durability, is that a consideration?
21 A. The durability of components that are used in automotive
22 products is something that is evaluated, is considered.
23 Q. What about safety of the system, is that a
24 consideration?
25 A. Of course, safety is also part of the design constraint.

1 That's why I said this is not a comprehensive look at
2 the design but is a demonstration of even at the level
3 that I've looked at, that there are a lot of things to
4 consider, and obviously there are other things to
5 consider as well that I may or may not have mentioned at
6 some point in the declaration.
7 Q. Okay. So is it fair to say that one of your themes in
8 your declaration and in your testimony right now is that
9 designing a drive train is extremely complicated?
10 MS. SHAH: Objection as to form.
11 THE WITNESS: So I guess I don't know what you
12 mean by a theme.
13 BY MS. MANDRUSIAK:
14 Q. Okay. You don't understand the word theme or you
15 disagree that's a theme of this portion of your
16 declaration?
17 MS. SHAH: Objection as to form.
18 THE WITNESS: I think that if you want to ask
19 me a question about what I've written in my declaration,
20 that I can answer that, but you're asking me something
21 that seems to be outside the context of the details that
22 I have specified here.
23 BY MS. MANDRUSIAK:
24 Q. Okay. Would you agree that designing a drive train is
25 complicated; yes or no?

1 A. I believe -- I don't know what you mean by complicated,
2 but I can answer your question as if you were asking me
3 are there a lot of factors to consider in the design of
4 an automotive drive train that might be larger than
5 other kinds of mechanical engineering design problems.
6 So I would say that, as I've outlined here, that there
7 are a lot of different interactions that -- in the
8 vehicle performance, the vehicle as it relates to how
9 the driver wants to use it, the road conditions, the
10 topography, that are all interrelated to the driveline
11 system design and control, and so that when you want to
12 make changes in the driveline, you have to look at the
13 potential impact on all these different aspects of the
14 vehicle. And are there design problems or design areas
15 that don't have such a large number of interactions?
16 Certainly. Are there areas that don't necessarily have
17 the safety issues that this area has since people are
18 actually using these and traveling in vehicles at high
19 speed? The answer would be, of course, there are other
20 design problems where safety may not be as big an issue.
21 So there --
22 Q. Okay. So for shorthand, then, can we refer to designing
23 drive train as complicated?
24 A. Well, I think that it's fair to say that it is an
25 involved -- an involved process.

1 Q. Okay. Is designing a transfer case for an automotive
2 all-wheel drive vehicle also an involved process?
3 A. Power -- it's -- a transfer case is one of the
4 powertrain components, so I don't understand your
5 question because it seems to ask something about the
6 design of powertrain systems.
7 Q. Okay. So we can say yes, then, because it involves
8 design of powertrains?
9 MS. SHAH: Objection, mischaracterizes the
10 earlier testimony.
11 THE WITNESS: So that I would say that it's
12 part of powertrain design and fits, therefore, with my
13 characterization of the design of the powertrain
14 process.
15 BY MS. MANDRUSIAK:
16 Q. Okay. Is designing a braking system for an automotive
17 all-wheel drive vehicle an involved process?
18 MS. SHAH: Objection as to form.
19 THE WITNESS: So are you -- I really don't
20 know what you're trying to ask me. The brake system is
21 another important and safety component on the vehicle
22 and has performance characteristics that interact with
23 other systems on the vehicle including the powertrain
24 system. I don't know whether -- I don't know what
25 you're asking me about the brake systems more than that.

1 BY MS. MANDRUSIAK:
2 Q. No, that's helpful, thank you. What about designing an
3 acceleration system; would your answer be the same as
4 for braking system?
5 A. I don't know what you mean by an acceleration system.
6 Q. The gas pedals and the interaction with the fuel lines.
7 MS. SHAH: Objection as to form.
8 THE WITNESS: I don't understand what you mean
9 by the gas pedal.
10 BY MS. MANDRUSIAK:
11 Q. You don't understand the word gas pedal in a car?
12 A. Are you literally talking about the design of the pedal?
13 Q. The system, acceleration system, the pedal is a part of
14 the acceleration system.
15 A. There is a considerable difference between talking about
16 design of the pedal and all of the system that is
17 responsible for accelerating the vehicle.
18 Q. What if you change one of the components in the system
19 responsible for accelerating the vehicle, would you have
20 to conduct modeling and testing?
21 A. Could you repeat the question, please.
22 Q. If you change a component in a braking or acceleration
23 system, would that require modeling and testing similar
24 to the modeling and testing required if you change a
25 component in a powertrain system?

1 MS. SHAH: Objection as to form.
2 THE WITNESS: I don't know what you mean by
3 similar.
4 BY MS. MANDRUSIAK:
5 Q. Would it require involved testing?
6 A. So what component are we changing?
7 Q. Would that affect your answer?
8 A. If you were changing the color of the accelerator pedal,
9 then this probably wouldn't be -- require a lot of
10 extensive testing.
11 Q. Sure. Let's say we're adding components that will
12 affect the control system.
13 MS. SHAH: Objection as to form.
14 THE WITNESS: So that seems very vague. I
15 don't understand that. What control system, what
16 components are we adding now?
17 BY MS. MANDRUSIAK:
18 Q. I'm trying to figure out if there's any other systems
19 you think are as involved a process to design as the
20 powertrain system.
21 MS. SHAH: Objection as to form.
22 BY MS. MANDRUSIAK:
23 Q. Because your declaration details at length how
24 complicated or, excuse me, involved the process is for
25 designing powertrain, and doesn't really specify

1 particular components, would seemingly include changing
2 the color of the shafts, et cetera, and so I'm just
3 trying to understand what other systems require this
4 involved design process?
5 MS. SHAH: Objection as to form, and
6 mischaracterizes evidence in the question.
7 THE WITNESS: My declaration made no attempt
8 to compare the design process of drivelines with the
9 many other design tasks that are required to develop a
10 vehicle, so it's beyond the scope of what I was asked to
11 look at and do.
12 BY MS. MANDRUSIAK:
13 Q. So you can't speak to the design process involved with
14 changing component of braking system?
15 MS. SHAH: Objection, asked and answered, and
16 objection as to form.
17 THE WITNESS: I said I didn't -- it's outside
18 the scope of what I was asked to look at here, so I'm
19 not prepared to discuss the design of brake systems
20 today.
21 BY MS. MANDRUSIAK:
22 Q. So I'm going to ask my question again because you didn't
23 answer it, so can you or can you not -- can you just say
24 "yes" or "no" -- can you speak to the design process
25 involved with changing a component of a braking system;

1 yes or no?
2 MS. SHAH: Objection, asked and answered,
3 argumentative.
4 THE WITNESS: As I have already said, it was
5 outside the scope of what I was asked to do, and so I
6 don't have a description here of a design of brake
7 systems.
8 BY MS. MANDRUSIAK:
9 Q. Okay. Thank you. Let's turn back to Paragraph 32. The
10 first sentence says that driveline dynamics analysis
11 started in the early 1900s. Does that mean people have
12 been designing and testing drivelines for over a hundred
13 years?
14 A. Could you repeat your question, please.
15 Q. Does that mean people have been designing and analyzing
16 drivelines for over a hundred years?
17 MS. SHAH: Objection, mischaracterizes the
18 evidence and testimony.
19 THE WITNESS: I guess I don't really
20 understand your question because it seems rather
21 straightforward what I've written here, which is that
22 the driveline dynamics analysis started in the early
23 1900s, and I give a publication that was written in 1905
24 on the subject, and the design of power -- of driveline
25 systems has evolved since at least then, and engineers

1 have been trained and have evolved in their use of these
2 systems since then at least.
3 BY MS. MANDRUSIAK:
4 Q. Okay. In Paragraph 33, the first sentence says the main
5 objective for the design of the driveline system is to
6 optimally distribute the power to the wheels in order to
7 achieve the desired performance that the particular
8 vehicle's manufacturer is seeking, given a set of road
9 conditions. Can you explain that sentence a little bit,
10 please.
11 A. So the first sentence is to try to give an overarching
12 objective to the design of driveline systems in
13 vehicles, and the idea of the driveline system is to
14 distribute power that's coming from the prime mover or
15 the engine, to distribute that power to the wheels. And
16 you do that design process with having a certain
17 performance that you're trying to achieve with the
18 vehicle, so the vehicle manufacturer has some
19 specifications that they're trying to reach with a
20 design, and this includes vehicle manufacturer's
21 understanding of where this vehicle is going to be used,
22 so the road conditions that it's expected to travel on,
23 the terrain conditions, the different ways in which the
24 vehicle might operate that they believe would be
25 relevant to their customers.

1 Q. So different specifications from a manufacturer could
2 move the design process in different directions, is that
3 correct?
4 MS. SHAH: Objection as to form.
5 THE WITNESS: So if the vehicle -- so would
6 you repeat your question, please, or rephrase the
7 question perhaps.
8 BY MS. MANDRUSIAK:
9 Q. Sure. So you mentioned that the manufacturer will have
10 some particular specifications that they're trying to
11 reach, and so I guess two different sets of
12 specifications could lead to very different designs,
13 correct?
14 MS. SHAH: Objection as to form.
15 THE WITNESS: Well, we haven't talked about
16 what the specifications might mean and what you mean by
17 two different sets of specifications. But I'll say that
18 in general that if I were teaching my class and I was
19 back at Michigan or talking to my colleagues about the
20 design of powertrain systems, and I would say that the
21 first thing you have to -- one of the first things you
22 need to do is to look at what kind of performance that
23 you are seeking, and if you have performance metrics set
24 A and then performance set B that are derived from your
25 understanding that your customers want to use this in

1 different ways, then my students would understand and I
2 would teach them about why this would lead to
3 potentially different kinds of driveline -- the design
4 process would move you to a different, potentially
5 different set of driveline components or the design
6 parameters would be different and/or the control of
7 those components might be different.
8 BY MS. MANDRUSIAK:
9 Q. If you turn to Paragraph 38, you discuss the mechatronic
10 revolution. When was this mechatronic revolution?
11 A. It's occurred in the last number of decades.
12 Q. So for decades automotive designers have been using
13 computers, sensors, and actuators?
14 A. Yes, they have, they've started understanding the
15 possibilities for computer control of vehicle systems
16 before they were actually implemented, but then they
17 slowly were introduced to vehicles in various ways and
18 have evolved over time.
19 Q. In the middle of the next page you say this mechatronic
20 revolution has spurred the development of new driveline
21 components including new differential designs. Can you
22 explain that a little bit, please?
23 A. Where are you speaking about?
24 Q. The middle of the next page, still Paragraph 38.
25 A. So the sentence this mechatronic revolution has spurred

1 the development of new driveline components including
2 new differential designs?
3 Q. Yes.
4 A. Okay. For example, a standard open differential as
5 described above allows one wheel on ice to spin with
6 little or no torque going to the wheel with traction.
7 Limited slip, which typically uses a clutch to absorb
8 some power, ensures that at least some of the power goes
9 to the wheel with traction. While this improves
10 traction, it operates well only based on simple feedback
11 mechanism. And that was something that I then referred
12 the reader to BorgWarner's tech book at Pages 134
13 through 147, which is Exhibit 2037. And then I go on to
14 say computerized control of driveline components can
15 improve traction under a wide variety of conditions and
16 modes of operation by employing sophisticated algorithms
17 based on measurements of the state of other driveline
18 components, other vehicle systems and the performance of
19 the vehicle as a whole.
20 Q. Can you think of any other examples other than the
21 limited slip example that's in your declaration?
22 A. So the idea, for example, that the 2-clutch rear end
23 unit that is described in the 440 patent, and that is an
24 example of a device which has come about with the
25 understanding that in that case, the clutches could be

1 controlled, it's an electromechanical clutch, and those
2 can be controlled by controllers that are receiving
3 information from sensors about the vehicle performance,
4 so that's an example of an evolving driveline component
5 that was spurred by the mechatronic revolution.
6 Q. Okay. In your declaration, do you argue that any of the
7 elements of claims -- or any of the elements of Claim 2
8 are missing from the prior art?
9 MS. SHAH: Objection, calls for a legal
10 conclusion.
11 THE WITNESS: Could you repeat the question,
12 please.
13 BY MS. MANDRUSIAK:
14 Q. Sure. In your declaration, do you argue that any
15 elements of Claim 2 are missing from the prior art?
16 I'm going to interrupt you, I don't want you
17 to re-read it. Can you remember making any of those
18 arguments off the top of your head?
19 THE WITNESS: You don't want me to read my
20 declaration?
21 BY MS. MANDRUSIAK:
22 Q. I don't want you to re-read it to answer this question.
23 MS. SHAH: Objection, argumentative. He's
24 allowed to read his declaration.
25 MS. MANDRUSIAK: I'm going to move on, then.

1 Can you remember making any arguments about
2 whether any elements from Claim 2 are missing from the
3 prior art?
4 THE WITNESS: I was reviewing my portion of
5 the declaration that it related to Claim 2 to remind
6 myself of all of the things that I said so that I could
7 answer your question accurately.
8 BY MS. MANDRUSIAK:
9 Q. And so you cannot without continuing to review, is that
10 correct?
11 A. I could answer your question without reviewing, but it
12 would potentially be inaccurate representation of what
13 I've written since I have a lot of things here and I
14 can't remember all of them without --
15 Q. So you stand on your declaration, then?
16 A. I stand with my declaration, and we can go through each
17 and every part of it if you'd like, and if you feel that
18 it's incomplete.
19 Q. Do you make any arguments about Claim 7 in particular in
20 your declaration?
21 MS. SHAH: Objection as to form.
22 THE WITNESS: And calls for a legal
23 conclusion.
24 MS. SHAH: And calls for a legal conclusion.
25 THE WITNESS: I guess I don't understand your

1 question.
2 BY MS. MANDRUSIAK:
3 Q. Okay. We can move on. I will give you a copy of the
4 440 patent or you can use the one in your binder if you
5 wish. It's previously been marked Exhibit 1001. Are
6 you familiar with this patent?
7 A. Yes.
8 Q. Have you read it in its entirety?
9 A. I have reviewed this patent and had subject to my
10 declaration amongst other topics.
11 Q. When was the last time you read it?
12 A. I guess I don't know what you mean by read it.
13 Q. Did you read it yesterday?
14 A. You mean did I read it from cover to cover?
15 Q. Yes.
16 A. Yesterday?
17 Q. Yes.
18 A. I reviewed the document yesterday.
19 Q. Okay. Have you read the prosecution history related to
20 this patent?
21 A. I have reviewed that.
22 Q. I'm going to give you what's been previously marked
23 Exhibit 1006, which is a portion of the prosecution
24 history. You can flip through it. Do you remember
25 reviewing that in the past?

1 A. Yes.
2 Q. Actually, Sangeeta, can I have one of those copies back.
3 I'm short.
4 Do you remember reviewing this particular
5 section?
6 A. Generally, yes.
7 Q. Okay. If you -- can you look at the sentence bridging
8 Pages 4 and 5, I'm talking internal Pages 4 and 5 of the
9 document, it's in bold. It says the examiner notes
10 there are several instances of indefinite claim language
11 throughout the claims?
12 A. Just a moment.
13 Q. No problem.
14 A. Did you say Page 4?
15 Q. Yes, internal Page 4, so starting right there, the bold.
16 A. I don't know what internal page numbering is.
17 Q. That's the internal page number, that's the external
18 page number.
19 A. Okay, thank you. Okay. So I'm on internal Page 4.
20 Q. The bold sentence starting at the bottom. Can you read
21 that into the record, please.
22 A. "The examiner notes that there are several instances of
23 indefinite claim language throughout the claims which
24 (like the entire present application) appears to be a
25 crudely translated foreign document."

1 Q. Do you agree or disagree with that statement?
2 MS. SHAH: Objection, calls for a legal
3 conclusion.
4 THE WITNESS: I have no opinion about that,
5 what the examiner said there.
6 BY MS. MANDRUSIAK:
7 Q. Do you have any opinion about the translation of the 440
8 patent?
9 A. I have no particular opinion about the translation of --
10 let me rephrase that, that I have read the U.S.
11 Patent 440, it's written in English, and that's what I
12 read, and I don't know what the examiner is referring
13 to.
14 Q. So you didn't have trouble understanding anything in
15 this patent?
16 A. I would say that we could go through the patent and look
17 at different parts. Certainly no document that's ever
18 been written is perfectly clear and there are parts of
19 the 440 patent that are clearer than other parts.
20 Q. I think that is a very fair statement. Can I get you to
21 turn to Column 9 of the 440 patent, please. Starting
22 with Line Number 6, so Column 9, Line 6, can you explain
23 what the first part of that sentence means?
24 A. Column 9, Line 5?
25 Q. Starting Line 6 is the sentence I'm asking about. In

1 particular, I'm asking about the den Fall phrase, if you
2 know what that refers to.
3 A. No, I don't know what that refers to, perhaps if I
4 studied it for a longer period of time I could help.
5 Q. That's fine.
6 A. But just sitting here as of today, I don't know what
7 that den Fall means.
8 Q. I suspect it's a translation error myself, but I just
9 wanted to make sure. Can you at a high-level summarize
10 what the 440 patent is about.
11 A. I mean it's well stated I think in the abstract. Drive
12 train of a vehicle is disclosed which comprises a
13 permanently driven primary axle and secondary axle
14 connectible to the primary axle via switch-on device
15 with a switch-on mechanism whereby the secondary drive
16 train output via side shaft couplings is transferred to
17 the drive wheels of the secondary axle. Because the
18 switch-on mechanism and/or the side shaft couplings have
19 frictionally engaged couplings, it can be that the
20 secondary axle is uncoupled, the shutdown section of the
21 secondary drive train located between the switch-on
22 device and the side shaft couplings is uncoupled both
23 from the primary axle and from the secondary drive
24 wheels such that there is no more power loss in the shut
25 down section whereby connecting the secondary drive

1 train during travel is possible all the same, and losses
2 in comfort and practicality do not have to be tolerated.
3 So I think that provides an overview of the
4 fact that there's a shutdown section, a shutdown section
5 which can be -- which is done to improve fuel economy,
6 it is a shutdown section which, as you find out in more
7 detail when you read the 440, is a quite extensive
8 amount of the secondary drive train, so there's an
9 attempt to really have a lot of secondary drive train
10 removed during 2-wheel drive from having any motion, and
11 that this can be switched in and out during motion of
12 the vehicle for the convenience of the driver.
13 There are also the characteristics of the
14 vehicle from a performance point of view, traction point
15 of view is looked at as being potentially improved by
16 this dual clutch rear end that they have provided which
17 operates in conjunction with a switch-on device.
18 Q. Okay.
19 A. And there are some packaging considerations that they
20 consider critical to their design as well that make the
21 design unique.
22 Q. What packaging considerations are those?
23 A. Well, for example, they are clear that the type of
24 switch-on device and the synchronizer that's located
25 with it are co-located or located on the primary axle

1 for packaging reasons.
2 Q. You mentioned the shutdown section in the 440 patent is
3 quite extensive. Do the claims specify what components
4 are shut down?
5 MS. SHAH: Objection, calls for a legal
6 conclusion.
7 THE WITNESS: I mean I do discuss this in my
8 declaration about the design more generally, I don't
9 know that I specifically draw a conclusion about what
10 the claims say with respect to this.
11 BY MS. MANDRUSIAK:
12 Q. Let's look at the claims. Do the claims specify how
13 large the shutdown section is?
14 MS. SHAH: Objection as to form, calls for a
15 legal conclusion.
16 THE WITNESS: So can you repeat your question,
17 please.
18 BY MS. MANDRUSIAK:
19 Q. Do the claims specify how large the shutdown section is?
20 MS. SHAH: Objection as to form, calls for a
21 legal conclusion.
22 THE WITNESS: So, first of all, I wasn't asked
23 to and didn't talk about this issue with respect to the
24 claims of the patent in my declaration, but I think
25 that -- so is there a concept of a shutdown section

1 described in the claims? Yes. And it's talked about
2 the devices that are related to what creates the
3 shutdown section, generally speaking, not doing a claim
4 analysis here. So the patent certainly talks about the
5 idea of a shutdown section, and then it seems that the
6 claims are also at least involved with this idea of a
7 shutdown section.
8 BY MS. MANDRUSIAK:
9 Q. Okay. Turn to column 4 of the patent, please. And
10 please read Lines 17 to 23 to yourself.
11 A. Column 4?
12 Q. Line 17 to 23. See the phrase that says speed
13 synchronization can be readily guaranteed by means of
14 gearbox synchronization familiar to the expert?
15 A. I do see that sentence, yes.
16 Q. Does that mean that various ways of synchronizing
17 gearboxes were known in the art?
18 MS. SHAH: Objection as to form.
19 THE WITNESS: So your question again is,
20 please?
21 BY MS. MANDRUSIAK:
22 Q. Were various ways of synchronizing gearboxes known in
23 the art?
24 A. So I would say that more generally, as my understanding
25 as an expert in this area, that if I were speaking to my

1 colleagues, that the idea of synchronizers, there are
2 different kinds of mechanical synchronizers that exist
3 that are used, for example, in transmissions to allow
4 you to shift the gears, provide meshing to allow, you
5 know, the engagement of the gears. So that type of
6 speed synchronization type devices for gearboxes I would
7 tell them is something that -- or that we might discuss
8 are things that have been known and were known at the
9 time of the relevant time frame of this patent.
10 Q. Okay. Turn to the claims again, please. What feature
11 does Claim 2 add to Claim 1?
12 MS. SHAH: Objection as to form, calls for a
13 legal conclusion.
14 THE WITNESS: So your question again, please.
15 BY MS. MANDRUSIAK:
16 Q. What feature does Claim 2 add to Claim 1?
17 MS. SHAH: Same objections.
18 THE WITNESS: So are you asking me to
19 interpret the claims or are you just asking me kind of
20 generally is there something generally in Claim 2 that
21 is different from what is talked about in Claim 1?
22 BY MS. MANDRUSIAK:
23 Q. I'm not trying to trick you. Do you understand how
24 dependent claims limit independent claims?
25 A. I'm --

1 Q. Just generally speaking.
2 A. I'm not a legal expert, but I understand generally the
3 relationship of a dependent and independent claim.
4 Q. Okay. So let's assume that this follows the patterns of
5 claims and patents and each of the dependent claims adds
6 features to Claim 1. Can you paraphrase what features
7 Claim 2 adds to Claim 1?
8 MS. SHAH: Same objections.
9 THE WITNESS: Claim 2 says the drive train as
10 claimed in Claim 1, having a side shaft coupling for
11 each side shaft of the secondary axle and wherein when
12 the secondary axle is connected to the primary axle, the
13 side shaft couplings allow a power distribution without
14 a differential gearing between the drive wheels of the
15 secondary axle to ensure transverse compensation.
16 BY MS. MANDRUSIAK:
17 Q. Okay. So let's look at those elements separately. Were
18 drivetrains having side shaft couplings for each side
19 shaft known in the art?
20 MS. SHAH: Objection as to form.
21 THE WITNESS: So we need to be careful here
22 about what we mean by the terms that we're using here,
23 because these are terms in the 440 patent that may or
24 may not have been constructed, and so whether or not
25 something exists in the prior art is -- depends on the

1 construction and is a determination by the Court.
2 BY MS. MANDRUSIAK:
3 Q. Did you construct such a coupling for -- in writing your
4 declaration?
5 MS. SHAH: Objection as to form, calls for a
6 legal conclusion.
7 THE WITNESS: I didn't -- my declaration
8 construction is a matter for the Court to decide. I
9 didn't construct any terms.
10 BY MS. MANDRUSIAK:
11 Q. Okay. But you had some understanding of this term in
12 order to opine on claims including that term, right?
13 A. So what are you referring to specifically in my
14 declaration that requires this construction that you say
15 that I used?
16 Q. The 440 patent uses the phrase side shaft coupling
17 throughout the specification and in the claims. Did you
18 have an understanding of that phrase when you wrote your
19 declaration?
20 A. I have a general understanding of that phrase.
21 Q. What is your understanding of that phrase?
22 A. But this is different from constructing a term.
23 Q. What's your understanding of that phrase?
24 A. So if I were discussing this with my colleagues and we
25 would understand that we were -- and we were looking at

1 this patent but outside of the context of this
2 litigation, we might generally agree that one of the
3 embodiments of a side shaft coupling would be
4 represented by generally the clutches in the -- each of
5 the clutches represents one side shaft coupling, but
6 that's just kind of generally without being too specific
7 to all of the parts and components that actually make up
8 the side shaft coupling but --
9 Q. So with the understanding that you and your colleagues
10 would have if you were discussing this, were drive
11 trains having side shaft couplings for each side shaft
12 known in the art?
13 MS. SHAH: Objection as to form.
14 THE WITNESS: So if the question is are there
15 other examples of units that have clutches in the rear
16 to potentially distribute the power to their secondary
17 wheels, the answer is yes, there were other units that
18 had those kinds of devices, had clutches to do that.
19 BY MS. MANDRUSIAK:
20 Q. Okay. Let's look at the second element of Claim 2.
21 Were there ways of ensuring transverse compensation
22 without a differential gearing known in the art?
23 MS. SHAH: Objection as to form.
24 THE WITNESS: I mean I guess I don't
25 understand what you're asking me at this point. Could

1 you rephrase that question, please.
2 BY MS. MANDRUSIAK:
3 Q. Claim 2 adds a feature that transverse compensation is
4 achieved without a differential gearing, right?
5 A. It has more to it than that, but that's part of what it
6 says.
7 Q. Was that part known in the art?
8 MS. SHAH: Objection as to form.
9 THE WITNESS: You mean you're taking -- so if
10 we're taking it out of the context of the claims here,
11 if you're asking me was the idea that if you had a
12 secondary unit, rear end unit or such that had no
13 differential but had two clutches, would it have been
14 known, would my colleagues know, are there documents
15 that describe the possibility of achieving transverse
16 equalization, in other words, being able to allow there
17 to be different amounts to have different rotational
18 speeds of the two wheels on either side of these
19 clutches, the answer is, yes, that would be known.
20 BY MS. MANDRUSIAK:
21 Q. Okay. That's exactly my question, thank you. Let's do
22 the same thing for Claim 3, although I think it'll be
23 easier because Claim 3 is similar to Claim 2 in that it
24 specifies two side shaft couplings and then discusses
25 longitudinal compensation; do you agree?

1 MS. SHAH: Objection as to form.
2 THE WITNESS: So your question again is,
3 please?
4 BY MS. MANDRUSIAK:
5 Q. I was just paraphrasing Claim 3 to understand the two
6 elements that it adds to Claim 1. The first is that it
7 includes two side shaft couplings, right?
8 A. Yeah, the drive train as claimed in 1, having a side
9 shaft coupling for each side shaft of the secondary
10 axle.
11 Q. Is that the same language as in Claim 2?
12 A. Yes.
13 Q. So your answer to Claim 2 would apply equally to Claim 3
14 for just that phrase?
15 A. What was the question about?
16 Q. About whether anything with two side shaft couplings was
17 known in the art.
18 A. So my answer to 2 was to talk specifically about an
19 embodiment that had a rear-end unit that had two
20 clutches.
21 Q. Right.
22 A. Not side shaft couplings, and to say that the idea of a
23 rear-end unit with two clutches was something that my
24 colleagues were aware of and I was aware of and our
25 documents show the existence of these kinds of units

1 that have two clutches in them.
2 Q. Okay. Were there ways of ensuring longitudinal
3 compensation without a differential gearing known in the
4 art?
5 A. Well, I don't -- I mean you're sort of picking apart the
6 claims here at the same time asking me questions about
7 what is generally understood about in the field, and I'm
8 trying to separate what is being claimed, which I'm not
9 speaking about, and what is generally known technically
10 about transverse compensation and longitudinal
11 compensation, and I believe that a rear end unit that
12 has two clutches, as I've described as exists in the
13 literature, and it was understood that these clutches
14 could provide functionality such as transverse
15 equalization and longitudinal compensation as well.
16 Q. Okay. Thank you. Let's look at Claim 6, please. What
17 feature does Claim 6 add to Claim 1?
18 A. Claim 6?
19 Q. Yes.
20 A. Well, Claim 6 depends on Claim 5, which depends on Claim
21 4, which then depends on Claim 1. And so 4 begins to
22 talk about a switch-on device comprises a positively
23 working power transmission gearing having an angular
24 gear working via cogged wheels.
25 And then 5 says that this drive train as

1 claimed in 4, wherein the switch-on device is arranged
2 on the primary axle, and the secondary drive train is,
3 when the secondary drive train is connected to the
4 primary axle, engaged to the primary drive train by the
5 switch-on mechanism.
6 So then 6 continues to talk about the
7 switch-on mechanism.
8 Q. Uh-huh.
9 A. The drive train as claimed in Claim 5, wherein a speed
10 synchronization in the switch-on mechanism of the power
11 transmission gearbox for the establishment of a positive
12 lock is supported by the at least one side shaft
13 couplings.
14 So Claim 5 is providing, generally speaking
15 here without getting into claim construction, is talking
16 about the synchronization, the speed synchronization
17 functionality that is being provided by the system for
18 the switch-on mechanism and saying that this speed
19 synchronization is in the switched on mechanism which is
20 on the primary axle.
21 Q. I think you stated Claim 5 but you meant Claim 6 in that
22 summary, right?
23 A. Sorry.
24 Q. That's okay. I just wanted to clear the record.
25 A. Yes, I was talking about what is generally in Claim 6.

1 Q. Okay. Were synchronizers of that type known in the art?
2 MS. SHAH: Objection as to form.
3 THE WITNESS: So I think you've already asked
4 me this question more generally whether or not the
5 concept of speed synchronizer was understood in the --
6 by people in the drive train area, so we've already
7 discussed that concept. I'm not sure what you're asking
8 me now that's different.
9 BY MS. MANDRUSIAK:
10 Q. So your answer would be the same that, yes, speed
11 synchronizers were generally known, including the type
12 described in Claim 6?
13 MS. SHAH: Objection as to form.
14 THE WITNESS: In general, in the general area,
15 the concept of a speed synchronizer as outside of the
16 context of the claim is a concept within powertrain
17 design, driveline design which is known, other devices
18 have used speed synchronizers, so the concept of a speed
19 synchronizer is not by itself new.
20 BY MS. MANDRUSIAK:
21 Q. Okay.
22 A. But I think the claim says something different than
23 that.
24 Q. What do you think the claim says that's different?
25 A. Well, it's not just saying that we invented speed

1 synchronizers, it's talking about the fact that the
2 speed synchronizer has to be in a specific place.
3 Q. And you don't think it was known to have a speed
4 synchronizer on the primary axle?
5 MS. SHAH: Objection, mischaracterizes the
6 evidence.
7 THE WITNESS: I'm saying that there is a --
8 you have to read this reference as a whole to understand
9 what the contribution is, and as I outlined a bit before
10 about what the contributions or what the patent is
11 generally about, so there are a combination of features
12 here that they claim that lead to novel contributions of
13 the 440 patent.
14 BY MS. MANDRUSIAK:
15 Q. Okay. And so what do you think is the novel
16 contribution of the 440 patent?
17 MS. SHAH: Objection calls for a legal
18 conclusion.
19 THE WITNESS: So without getting into -- I
20 mean I think I answered this before when we talked
21 generally about what the 440 patent was about, and we
22 talked about the fact that it's related to fuel economy,
23 that it's related to maintaining the drivability of the
24 vehicle and potentially giving it enhanced
25 drive-ability, about the ease of being able to engage

1 and disengage the 4-wheel, the -- yeah, engage 4-wheel
2 drive system that they present and that there are
3 also -- this is done with some packaging issues in mind,
4 and all of these things together are done -- are in
5 total of the kind of features of the 440 patent,
6 generally speaking.
7 BY MS. MANDRUSIAK:
8 Q. Do you agree that the features of the 440 patent,
9 generally speaking, are taught by the Teraoka reference?
10 A. No, I --
11 MS. SHAH: Objection as to form.
12 THE WITNESS: I have a rather large section in
13 my declaration. We can talk about the Teraoka reference
14 if you'd like.
15 BY MS. MANDRUSIAK:
16 Q. So you don't think that GKN should have disclaimed
17 Claims 1, 4, and 5?
18 MS. SHAH: Objection, calls for a legal
19 conclusion.
20 THE WITNESS: I didn't say that.
21 BY MS. MANDRUSIAK:
22 Q. So of the features of the 440 patent you just described,
23 which of those is not also taught in Teraoka?
24 A. Well, let's go to that section of my declaration.
25 Q. Sure.

1 A. So Teraoka talks about a 4-wheel drive system that it
2 says has a deficiency of there being too much loss in
3 the system, and they want to improve fuel economy,
4 that's their -- that's his intention, and alters the
5 prior art that he provides in the figure in his -- so
6 the, I guess, so the placement of the clutch that he has
7 in the differential, he moves it from being on the
8 engine side of gear reduction unit to the wheel, rear
9 wheel side of the gear reduction unit with the idea that
10 the speeds associated with the turning wheels and the
11 approximately stationary drive train -- secondary drive
12 train that was disconnected would be smaller by moving
13 the clutch to the rear wheel side of the speed reduction
14 gears. So that was his main focus was to make that
15 change, which was to reduce the drag associated with the
16 clutch by reducing the speeds that it would see by
17 having it on the other side of this gear reduction unit.
18 So that's the contribution and focus of the Teraoka
19 reference.
20 Q. So what features of the 440 patent are not also in
21 Teraoka? Let me -- the features you mentioned were fuel
22 economy, drivability, ease of engaging and disengaging,
23 and the switch-on mechanism being on the primary axle.
24 Are any of those not discussed in the Teraoka reference?
25 MS. SHAH: Objection as to form.

1 THE WITNESS: There's a lot of things
2 discussed in the reference so I'm not sure what you are
3 trying to establish. The idea is what is the main
4 contribution or the main invention here, the main thing
5 that the author was trying to -- point of novelty which
6 was to move the clutch to the other side of the speed
7 reduction unit.
8 BY MS. MANDRUSIAK:
9 Q. Do you think references are only considered for their
10 so-called novel contribution or are they considered in
11 their entirety?
12 MS. SHAH: Objection as to form.
13 THE WITNESS: So I don't know, your question
14 was very, very, very broad, and I'm saying that the
15 focus of the reference was to move this clutch to the
16 other side of the gear reduction unit to improve fuel
17 economy, and that was the objective of the design
18 change. And so under the section in Teraoka under the
19 problem to be solved by the invention, it says,
20 "However, since a wet multi-plate clutch is used for the
21 coupling 521 even when it is uncoupled by the
22 controller, if rotation is inputted into one side, the
23 viscosity of the oil will generate drag torque between
24 the clutch plates. Thus, in the conventional 4-wheel
25 drive system described above, the 2-4 switching

1 mechanism 507 and dog clutch 535 are arranged as to
2 prevent input from the engine 501 side and input from
3 the rear wheel 531, 533 side from being inputted into
4 the coupling. If there were no dog clutch during 2
5 wheel travel, the drag rotation of the" --
6 BY MS. MANDRUSIAK:
7 Q. I'm going to stop you as nonresponsive to my question,
8 which was --
9 MS. SHAH: Objection, argumentative.
10 Q. -- do you think references are only considered for their
11 so-called novel contribution or are they considered in
12 their entirety? That is a general question not specific
13 to Teraoka.
14 MS. SHAH: Objection as to form, and
15 argumentative.
16 THE WITNESS: I was trying to point you to
17 what is the point of novelty as described by the author.
18 BY MS. MANDRUSIAK:
19 Q. Why do you think that's important to answering my
20 question?
21 MS. SHAH: Please let him complete his
22 sentence before you jump in with a question.
23 THE WITNESS: Why do I think that what the
24 author -- what the invention is about is important?
25

1 BY MS. MANDRUSIAK:
2 Q. To answering my question about whether you need to
3 consider the reference as a whole, yes.
4 A. I thought I answered your question about that saying
5 that the question wasn't answerable without being less
6 broad, that you just made a very general statement, do
7 references have to be considered as a whole. What's the
8 context? Are you talking about legal requirements?
9 What are you talking about?
10 Q. Did you ever hear that there's a legal requirement that
11 prior art be considered in its entirety from Ms. Shah?
12 MS. SHAH: Objection, objection as to form.
13 THE WITNESS: I am aware that in -- well, I'm
14 not a legal expert so I really can't answer your
15 question definitively.
16 BY MS. MANDRUSIAK:
17 Q. When you considered the references for your declaration,
18 did you consider the references in their entirety; yes
19 or no?
20 A. I read the references in their entirety, and I
21 understood what the references were teaching that was
22 new and what they were describing as the problem to be
23 solved and generally understood what the patents were
24 about.
25 Q. All right. Let's move on to Claim 7. What feature does

1 Claim 7 add?
2 A. Just a minute.
3 MS. SHAH: Objection as to form.
4 BY MS. MANDRUSIAK:
5 Q. So we can kind of get back, we were talking about the
6 dependent claims and the features they add to the
7 independent claims. We did it for Claims 2, 3, and 6.
8 Now I'd like to do the same for Claim 7. What feature
9 does dependent Claim 7 add?
10 MS. SHAH: Objection as to form.
11 THE WITNESS: So I can't answer your question
12 more specifically than to tell you what it says in the
13 claim, which I know you can read for yourself, but it
14 says in Claim 7 that the drive train as claimed in Claim
15 6, wherein the at least one side shaft couplings is
16 formed by a frictionally engaged multiple disc clutch,
17 whereby the friction plates connected in a torque-proof
18 way to the secondary drive wheels cooperate as inner
19 plates with an inner plate carrier and whereby the
20 friction plates located on the drive train side of the
21 vehicle cooperate with an outer plate carrier as outer
22 plates.
23 BY MS. MANDRUSIAK:
24 Q. Were frictionally engaged multiple disc clutches with
25 those features known in the art?

1 MS. SHAH: Objection as to form.
2 THE WITNESS: The claim is not talking about a
3 frictionally engaged multiple disc clutch in generic
4 terms. It's talking about an invention of a drive train
5 system which is utilizing it in a particular way, and
6 it's describing that way in --
7 BY MS. MANDRUSIAK:
8 Q. In general terms, were frictionally engaged multiple
9 disc clutches with these features known in the art?
10 MS. SHAH: Objection as to form.
11 THE WITNESS: I guess I don't understand your
12 question because I just answered you that this is part
13 of -- the invention is the way that things are arranged
14 in conjunction with all of these other components that
15 are outlined in the other dependent and independent
16 claims.
17 BY MS. MANDRUSIAK:
18 Q. So you were able to answer Claims 2 and 3 that generally
19 vehicles with two side shaft couplings were known in the
20 art, right?
21 A. I --
22 MS. SHAH: Objection, mischaracterized his
23 testimony.
24 THE WITNESS: I didn't say that. I said that
25 they were rear end units or the drive train components

1 for secondary wheels that existed that my colleagues and
2 I know about and that you can find in documents that
3 have two clutches, that that idea for using two clutches
4 in a rear-end unit was -- the general component was --
5 has been described in the art, in the literature prior
6 to the 440 patent.
7 BY MS. MANDRUSIAK:
8 Q. Were any of the clutches in those rear end units
9 frictionally engaged multiple disc clutches?
10 A. I'd have to check, but multiple plate disc clutches are
11 common.
12 Q. Are frictionally engaged multiple disc clutches common?
13 A. Yes.
14 Q. I have one more question in this section. Does the 440
15 patent cover the GKN Twinstar?
16 MS. SHAH: Objection, calls for a legal
17 conclusion.
18 THE WITNESS: I don't -- haven't studied that
19 particular issue, I don't have opinion about that.
20 BY MS. MANDRUSIAK:
21 Q. Are you aware of the part of your declaration addressing
22 secondary considerations?
23 A. Yes.
24 Q. Those are mostly directed to the GKN Twinstar, right?
25 A. That part is in part directed toward the GKN Twinstar

1 yes.
2 Q. Do you know that that's only relevant if the 440 patent
3 covers the GKN Twinstar?
4 A. I don't know the answer to that question. I do know
5 that more generally from a nonlegal point of view that
6 my discussion in that area of my -- about those units is
7 about the technology that is in the 440 patent, that to
8 the extent that that is true -- well, let me change
9 that -- so I have not made a study of the exact
10 relationship between these products and the 440 patent.
11 It was outside the scope of my -- what I was asked to do
12 for this declaration, but it is my understanding that --
13 let me change that. I understand that from a lay
14 perspective, that the secondary considerations, that the
15 commercial success and other things that I discussed
16 have to be related to the 440 patent in some way that I
17 legally don't understand exactly, and I have not done an
18 extensive analysis to know whether or not -- to what
19 extent these products were covered by the 440 patent,
20 except that I generally looked at their features, and it
21 appears that they do, but I have not made an extensive
22 study of that.
23 Q. Okay. I think we can take a break. It's 12:30, might
24 as well break for lunch.
25 (A recess was taken from 12:30 p.m. to 1:44

1 p.m.
2 BY MS. MANDRUSIAK:
3 Q. I'm ready if you are.
4 A. Yes, I am.
5 Q. So let's talk about Teraoka a little more. Here's a
6 copy, you can use your own copy or that one if you wish.
7 Can I get you to turn to Paragraph 31, please. Just
8 read that to yourself.
9 Do you see where it says the present invention
10 reduces the number of parts, weight and cost as compared
11 to the prior art?
12 A. Yes, just a minute, please, I just want to center myself
13 in the -- okay, so again your question, please.
14 Q. I didn't ask you a question yet, I just asked if you saw
15 that portion. So are reducing the number of parts,
16 weight and costs common industry goals in the automotive
17 industry?
18 A. Generally speaking, that's a fair statement.
19 Q. Okay. Can I get you to turn to Paragraph 77 of your
20 declaration, please.
21 You're talking about the annotated drawing you
22 made of the figure from Teraoka.
23 A. What was the Paragraph Number?
24 Q. 77.
25 A. Okay. I'm there.

1 Q. Did you create that drawing?
2 A. This is a drawing out of a patent, right, some
3 annotation on top of it, it's colored.
4 Q. Did you add those annotations?
5 A. No, I did not.
6 Q. Do you agree with those annotations?
7 A. I mean generally, yes.
8 Q. Generally, yes. Is there anything you don't agree with?
9 A. Well, as I said, this is representing generally how the
10 clutch works and the parts that are rotating and not
11 rotating are generally thought in principle to be
12 behaving.
13 Q. Do you know why the torque decoupling location is placed
14 where it is indicated in that drawing?
15 A. Talking about the circle, red circle with the X?
16 Q. Yes.
17 A. It represents, generally speaking, the interaction or
18 lack of interaction between the inner and outer plates
19 there of the clutch, and in this particular -- so this
20 is where you transfer torque or don't transfer torque
21 depending on whether the clutch plates are squeezed
22 together.
23 Q. So it's not necessarily an accurate representation of
24 precisely what's happening in Teraoka, it's more of a
25 general representation?

1 MS. SHAH: Objection as to form.
2 THE WITNESS: I mean this is an accurate
3 representation of the general ideas that are being
4 expressed in this section of my declaration, which is
5 why I used the figure to help illustrate the idea.
6 BY MS. MANDRUSIAK:
7 Q. Does Teraoka explain specifically where the coupling
8 takes place in its rear differential module?
9 MS. SHAH: Objection as to form.
10 THE WITNESS: I don't know what you mean by
11 does he explain the decoupling location, not sure that
12 he uses that term, and I'm not sure how specific he is
13 in actually describing this particular phenomenon, but
14 it is described generally in his patent, and we can go
15 into it, we can -- I can show you where it's talked
16 about.
17 BY MS. MANDRUSIAK:
18 Q. Okay. So where is the location of the decoupling talked
19 about, even if it's not that particular term decoupling?
20 A. So it just -- first place that I find, Line -- excuse
21 me, Paragraph 50, it says the rear differential 25
22 comprises outer case 65, inner case 67, bevel gear type
23 differential mechanism 69, clutch mechanism 71 (coupling
24 constructed using a wet multi-plate clutch), et cetera.
25 Q. So decoupling occurs somewhere within the multi-plate

1 clutch, is that correct?
2 A. So the coupling is done by this clutch mechanism, and
3 that's generally what a clutch does, it provides for the
4 coupling and decoupling of the -- of two shafts or an
5 input and an output on the device, so that's the first
6 description that I found here.
7 Q. So looking at that description, then, I just am trying
8 up to understand why the little X in your annotated
9 drawing is placed precisely where it is.
10 A. I mean it is the action of the inner plates and outer
11 plates moving in contact with one another that creates
12 the friction and the transfer of torque from the inner
13 to the outer or outer to the inner. So if you're -- I
14 don't know what your concern is -- if you're concerned
15 that it's a multi-plate clutch, I only show one point,
16 so there are multiple points of contact, there are lines
17 of contact, there are surfaces in contact but -- so it
18 is a sketch, and, generally speaking, the contact is
19 between those plates that are indicated in that sketch
20 by the vertical lines that are interdigitated.
21 Q. Does the center shaft number 21 rotate in Teraoka when
22 the vehicle is in 2-wheel drive? And if it's helpful,
23 I'll point you also to Paragraph 75 of your declaration.
24 A. So your question again, please, is?
25 Q. Does the center shaft number 21 rotate in Teraoka when

1 the vehicle is in 2-wheel drive?
2 A. The center shaft is intended to be idle when it's in
3 2-wheel drive decoupled from the rest of the system by
4 the 2-4 switching mechanism 7 and the clutch mechanism
5 71 we spoke about a few minutes ago.
6 Q. So the shutdown section in Teraoka includes at least the
7 central shaft, correct?
8 A. Well, I will agree that we were talking about propeller
9 shaft 21, center shaft 21, I think, is what you called
10 it, you changed the name of that, so propeller shaft 21
11 is what is described in Paragraph 75 as the component
12 that stops moving in 2-wheel drive.
13 Q. Okay. I'm going to give you what's previously been
14 marked Exhibit 1003, which is the Watanabe reference.
15 Are you familiar with this document?
16 A. Yes.
17 Q. Have you read it in its entirety?
18 A. I have viewed this document for the purposes of
19 preparing my declaration.
20 Q. When was the last time you reviewed it?
21 A. I reviewed it -- I had -- I did review parts of it
22 yesterday.
23 Q. Is this pertinent art one skilled in the art would be
24 aware of?
25 MS. SHAH: Objection as to form.

1 THE WITNESS: I didn't understand your
2 question.
3 BY MS. MANDRUSIAK:
4 Q. If you recall, back in Paragraph 18 of your declaration
5 you explained that your understanding is that a person
6 of ordinary skill in the art would be aware of all
7 pertinent art.
8 A. Yes.
9 Q. So is it your understanding that this is pertinent art
10 one skilled in the art would be aware of?
11 MS. SHAH: Objection as to form, calls for a
12 legal conclusion.
13 THE WITNESS: So I don't think that I
14 understand your question and I would like it -- really
15 what I described in my declaration. It's my opinion
16 that it wouldn't have been obvious to a person having
17 ordinary skill in the art to turn to the clutches that
18 are described in Watanabe with the powertrain components
19 or the drive train components of Teraoka.
20 BY MS. MANDRUSIAK:
21 Q. And high-level why is that?
22 A. Well, it's described in great detail in my declaration.
23 Q. I'm asking you for a high-level summary, then, of your
24 declaration.
25 A. Well, first issue I would say is that the problem that

1 Watanabe is trying to solve is quite different than the
2 problem that was being solved by Teraoka. I don't think
3 that -- I don't think that Teraoka, who was looking to
4 reduce fuel consumption by changing the position of the
5 clutch in the prior art design to slightly different
6 position, would be looking to make a choice of a
7 completely different type of rear end than the one that
8 Teraoka was working with and made modifications to. So
9 the eliminating the differential and the clutch that he
10 had been putting in the kind of system that is described
11 in Watanabe, it would be a major change in the design
12 and not be a simple substitution.
13 Q. Okay. Turn to Paragraph 85 in your declaration, please.
14 A. So I will say that's not the end of my answer.
15 Q. I'm sorry.
16 A. It's sufficient if you want to go on at the moment.
17 Q. Okay.
18 A. Talk more in detail about any and all of my opinions.
19 Q. I think we'll get into more detail. So let's go to
20 Paragraph 85. So here you state that Watanabe can
21 provide switching between 2-wheel drive and 4-wheel
22 drive without a 2-4 switching mechanism, right?
23 A. Yes.
24 Q. Does Watanabe also discuss embodiments that include a
25 2/4 switching mechanism?

1 A. Watanabe does describe on Page 147 -- it's hard to
2 figure out how I'm going to tell the court reporter
3 where I am because there's no line numbers here.
4 Q. How about you just --
5 A. Page 4.
6 Q. Say upper left or lower left column or right or left.
7 A. It's the right column on Page 4, and it would be the
8 upper part of that column. It says because 2-4
9 switching can be done in this manner without requiring
10 an intermittent mechanism such as a 2-4 switching
11 mechanism, the 2-4 switching mechanism is unneeded,
12 allowing simplification of the mechanism, lighter
13 weight, and lower costs.
14 Q. Right. So that's the part we just discussed from
15 Paragraph 85. I'm asking if there is also embodiments
16 which do include a 2-4 switching mechanism?
17 A. Well, I am not remembering a specific place where it
18 shows an embodiment with a 2-4 switching mechanism, but
19 I can't say off the top of my head that such a mechanism
20 is not included. If you want to show it to me, I can
21 answer questions about it --
22 Q. Sure.
23 A. -- if it exists.
24 Q. Sure. Let's look at Page 148, the lower left column,
25 the third paragraph starts if a 2-4 switching mechanism

1 is provided; you see that?
2 A. Yes.
3 Q. Please read that paragraph into the record.
4 A. Certainly. "If a 2-4 switching mechanism is provided
5 and the 2-wheel drive mode is switched to, releasing the
6 multiple plate clutches 89 and 91 causes rotation of the
7 drive system for the rear wheels 25 and 27 to stop.
8 Accordingly, useless rotation and the wear, vibration,
9 and noise caused thereby can be prevented, as can a
10 concomitant fall in mileage. The same effect can thus
11 be obtained without providing a free hub clutch, and
12 operation becomes more solid."
13 Q. Okay. So does that affect your opinion in Paragraph 85
14 where you say the disclosure of Watanabe is not
15 concerned at all with increasing fuel economy by
16 reducing losses caused by drag and churning losses of
17 the spinning parts?
18 A. My Paragraph 85 says that it is intended to relay that
19 Watanabe's focus was on -- and point of novelty is the
20 reduction in -- excuse me, was the focusing on the
21 lubrication of these clutches in his driveline component
22 so as to make sure that they were properly lubricated
23 and didn't have some of the failure problems that he
24 notes have been happening. And he said that with this
25 properly operating dual clutch device that he has, that

1 he can solve this problem, and that is the focus of his
2 invention, and, in fact, he says that with his
3 invention, a 2-4 mechanism is not required. The
4 paragraph that you just had me read shows that he is
5 aware that his mechanism could be used in conjunction
6 with a 2-4 mechanism if one were provided.
7 Q. So in that case, that sentence is not completely
8 accurate, right? It is, therefore, my opinion that the
9 disclosure of Watanabe is not concerned at all. I mean
10 I guess based on what you would say, the primary focus
11 maybe is not concerned with increasing fuel economy,
12 something like that?
13 MS. SHAH: Objection, mischaracterizes the
14 testimony.
15 THE WITNESS: I mean I would say that my
16 statement is consistent with the title, which is that
17 his title of his invention is a power transmission
18 device, so he's concentrating on this device that has
19 the two clutches, and the problem to be solved by his
20 invention -- hence, the present invention has an object
21 to provide the power transmission device in which
22 friction plates do not suffer from lack of lubrication,
23 seizing, or the like -- that's the problem that he's
24 trying to solve with this disclosure, and he provides a
25 way to do that.

1 BY MS. MANDRUSIAK:
2 Q. Is your statement in Paragraph 85 consistent with the
3 paragraph we just read on Page 148?
4 MS. SHAH: Objection, asked and answered.
5 MS. MANDRUSIAK: I don't think that has been
6 asked.
7 THE WITNESS: I think that my statement is
8 consistent with a disclosure that shows that his problem
9 that he's trying to solve is to reduce the failure of
10 these clutches in these types of components in the rear
11 end, that's what his disclosure is concerned with. And
12 somebody of ordinary skill looking to solve the problem
13 of reducing drag and churning losses of spinning parts,
14 which is what Teraoka was trying to solve, wouldn't be
15 looking at this reference to try to aid in the solution
16 to that problem.
17 BY MS. MANDRUSIAK:
18 Q. So you cannot answer "yes" or "no" the statement in
19 Paragraph 85 is consistent with the paragraph we read on
20 Page 148?
21 MS. SHAH: Objection, asked and answered,
22 argumentative.
23 THE WITNESS: I feel I did answer the
24 question.
25

1 BY MS. MANDRUSIAK:
2 Q. So the paragraph we read on Page 148 specifically
3 discusses stopping rotation where vibration and noise
4 when in 2-wheel drive. That's precisely the issue of
5 Teraoka, isn't it?
6 MS. SHAH: Objection as to form.
7 THE WITNESS: No, I don't believe that the
8 answer to -- the answer to your question is no, Teraoka
9 is concerned with the drag in the clutch of the
10 particular type of system that he has that he outlines
11 in his patent, which is quite different than what
12 Watanabe is talking about, and he specifically is
13 concerned about the losses associated with the residual
14 drag torque in his multiple plate clutch. That's not
15 what is being talked about here in Paragraph 148.
16 BY MS. MANDRUSIAK:
17 Q. What does reducing drag torque mean?
18 A. In what context do you --
19 Q. In the context of Teraoka, what is reducing drag torque?
20 Let me ask a different question. Is drag torque a type
21 of energy loss?
22 A. The drag torque that Teraoka is concerned with leads --
23 is a mechanism of energy loss.
24 Q. And the paragraph on Page 148 that we just read talking
25 about reducing rotation and wear, vibration, and noise

1 and reducing mileage, you don't think that's related to
2 energy loss?
3 MS. SHAH: Objection as to form,
4 mischaracterizes the testimony.
5 THE WITNESS: I think that you're mixing and
6 matching things here. The paragraph on 148, if I can
7 find it again, talks about the -- talks about vibration
8 and noise that is caused, and that this vibration and
9 noise can result in a fall in mileage so.
10 BY MS. MANDRUSIAK:
11 Q. What causes those reductions?
12 MS. SHAH: Objection as to form.
13 THE WITNESS: Your question, please?
14 BY MS. MANDRUSIAK:
15 Q. What causes those reductions?
16 A. What reductions?
17 Q. The reductions in wear, vibration, noise.
18 A. He's saying that if you stop the center driveline, the
19 wear and vibration and noise associated with the
20 rotation of that driveline can be prevented. And then
21 he says that if you can do this, then you will -- that
22 you can prevent the fall in mileage that occurs from
23 these factors being present.
24 Q. Okay. If you stop a central driveline from rotating,
25 will you reduce energy loss?

1 A. Now, who's -- are you talking about this now in the
2 context of one of these documents or are you talking
3 about a general --
4 Q. In general, as an expert in this field, if you stop
5 rotation of a center shaft, will you reduce energy loss?
6 A. So if I were talking to my colleagues and we were
7 talking about where there are losses in drive trains
8 generally speaking, if the -- rotating a shaft such as a
9 center line shaft when it's not doing any work, useful
10 work, will in general be wasting some amount of energy
11 from different mechanisms that exist.
12 Q. Okay. Thank you. Would anything prevent a designer
13 from implementing a clutch based differential in an
14 automotive all-wheel drive product?
15 MS. SHAH: Objection as to form.
16 THE WITNESS: I didn't understand the
17 question.
18 BY MS. MANDRUSIAK:
19 Q. Can you think of anything that would prevent a designer
20 from implementing a clutch based differential in an
21 automotive all-wheel drive product?
22 A. I still don't understand your question.
23 Q. What part don't you understand?
24 A. That just I don't know who the designer is, I don't know
25 what this differential clutch mechanism is you're

1 talking about, it's a very general question.
2 Q. Let's say the designer is one of skill in the art of the
3 440 patent. Does that help?
4 MS. SHAH: Objection as to form.
5 BY MS. MANDRUSIAK:
6 Q. Let's say the clutch differential is the clutch
7 differential of Watanabe. Can you answer it now?
8 A. So you have Watanabe's clutch differential. Can you
9 show me his clutch differential.
10 Q. Or his clutch rear differential module, excuse me,
11 whatever you want to rephrase the Watanabe product as.
12 A. Okay, so his rear end device that has two clutches,
13 okay, we have that device, okay.
14 Q. Would anything -- can you think of anything that would
15 prevent one skilled in the art from implementing that in
16 an automotive all-wheel drive product?
17 MS. SHAH: Objection as to form.
18 THE WITNESS: I don't really understand what
19 you mean by implementing it.
20 BY MS. MANDRUSIAK:
21 Q. You don't understand implementation of a component in an
22 automotive product?
23 MS. SHAH: Objection, argumentative.
24 THE WITNESS: I understand what implementation
25 means in a general sense. I'm asking you in the context

1 of this deposition, what do you mean by that phrase?
2 BY MS. MANDRUSIAK:
3 Q. Using your general understanding, please go ahead and
4 answer the question.
5 A. Okay. So what is the problem that we're trying to solve
6 here? I don't understand.
7 Q. Let's say that the manufacturer says we want to have a
8 clutch rear module like Watanabe in our product. Can
9 you do it?
10 A. Okay, and so then the next question would be, okay, what
11 kind of performance do you want this product to have or
12 what kind of conditions, and I've outlined in my
13 declaration a process that you can go through in
14 driveline design to see what kind of performance you can
15 obtain, and so one could go through this modeling
16 simulation even getting to a testing, a point to see
17 whether or not for the particular specifications that
18 you have, the use, the performance levels that you're
19 looking for, the mileage levels that you're looking for,
20 whether or not it would be -- and your cost goals, et
21 cetera, et cetera, whether or not you would be able to
22 actually, as you used the word, implement, get something
23 that was working, and you'd have to also do all the
24 controls work and sensors and all that, decide on how
25 much flexibility and functionality you want. So if you

1 did all of that work, in general, you could evaluate
2 whether or not a two-clutch system such as one that is
3 shown in Watanabe or the one that's shown in the 440
4 patent and as we know exists in some cases in production
5 vehicles. So is it implementable, a dual clutch system,
6 and we have technology that shows that it can be
7 successfully implemented.
8 Q. Okay. You mentioned the GKN Twinstar product as an
9 example of that type of implementation, is that right?
10 MS. SHAH: Objection, mischaracterizes earlier
11 testimony.
12 THE WITNESS: I said the GKN product, I don't
13 know which GKN product, but the Twinstar product that I
14 mentioned in my declaration is a product that has a dual
15 clutch rear end or secondary, you know, component.
16 BY MS. MANDRUSIAK:
17 Q. What are the benefits of the GKN Twinstar product?
18 MS. SHAH: Objection as to form.
19 THE WITNESS: What is your -- I didn't really
20 do a study on to say what the benefits are. I know, as
21 I've talked about in my declaration, some of the praise
22 the product has gotten, seems to be implemented in more
23 and more vehicles, and they talk about some of the
24 benefits in terms of performance enhancements, slight
25 increase in weight but increase in performance, getting

1 in some cases good mileage in the context of this high
2 performance that you get with the unit, so generally
3 that kind of discussion is in my declaration.
4 BY MS. MANDRUSIAK:
5 Q. So is it your opinion the benefits of the Twinster
6 outweigh the weight increase --
7 A. In what context are you talking about?
8 Q. Well, is it your opinion that an increase in weight of a
9 component would generally deter one skilled in the art
10 from making that modification?
11 A. It could, it depends on what your goals are.
12 Q. So in some circumstances, an increase in weight is
13 acceptable?
14 A. There are circumstances, yes, where you might gain
15 additional performance at the tradeoff with sometimes
16 cost, sometimes weight, there can be -- there's all
17 sorts of tradeoffs that you have to make.
18 Q. Does the GKN Twinster enable torque vectoring?
19 A. So I have several citations in my Section 7 secondary
20 considerations inclusions that talk about the torque
21 vectoring capability of the Twinster system being
22 recognized by -- in different articles. So in that
23 sense, the Twinster system is recognized in some circles
24 as having a torque vectoring system.
25 Q. Are there some circles that don't recognize it as having

1 a torque vectoring system?
2 A. I don't know.
3 Q. Why did you choose that phrasing? It seems interesting.
4 MS. SHAH: Objection, argumentative.
5 THE WITNESS: I just, I haven't studied the
6 Twinster system in great detail, so I'm relying on these
7 articles that have come out describing and praising the
8 device, and so it describes as a torque vectoring
9 system. You asked me is it a torque vectoring system.
10 These articles describe it that way. I can't say a lot
11 more about it without studying the product in detail.
12 BY MS. MANDRUSIAK:
13 Q. Can you explain what torque vectoring is?
14 A. So I can explain it from a technical perspective that's
15 outside the context of what GKN is doing and what any of
16 these prior art documents are doing, I just, if I was
17 talking to my students about torque vectoring, is that a
18 sufficient context?
19 Q. Yes.
20 A. Okay. So the idea is that you have with a torque
21 vectoring concept, the ability to deliver a certain
22 amount of torque or a certain ratio of torque to the
23 different wheels of the vehicle depending on how you set
24 this thing up. In a traditional open differential, you
25 don't have torque vectoring capability, the

1 characteristics of the differential are fixed, and the
2 torque relationships are fixed. So torque vectoring can
3 be seen in the torque vectoring system to be one in
4 which you are able to control with at some level the
5 amount of torque that goes to the different wheels or
6 that you are vectoring torque with.
7 Q. Is torque vectoring a desired feature in a vehicle?
8 MS. SHAH: Objection as to form.
9 THE WITNESS: It depends on context.
10 BY MS. MANDRUSIAK:
11 Q. In some instances could it be a desired feature in a
12 vehicle?
13 A. I mean there are products like the Twinster product,
14 which is a torque vectoring product, that's receiving
15 praise for its capabilities, so apparently, yes, it's a
16 desirable characteristic in some cases. There's
17 tradeoffs to be made in providing that capability.
18 Q. What are the tradeoffs?
19 A. Well, there are tradeoffs when you make any decision to
20 design features and use technology of different type in
21 drive train and other parts of the vehicle for that
22 matter. There are performance, cost, weight, you know,
23 mileage, wear, stability, all of the things that I talk
24 about in here that are part of the design process are
25 the tradeoffs that you make, and so you gain something

1 with torque vectoring, probably have to give up some
2 things.
3 Q. Okay. How can torque vectoring be achieved, broadly
4 speaking?
5 MS. SHAH: Objection as to form.
6 THE WITNESS: I don't understand what you mean
7 how can it be achieved.
8 BY MS. MANDRUSIAK:
9 Q. So the Twinster uses a multi-plate clutch system to
10 achieve torque vectoring, right?
11 A. That's my general understanding, yes.
12 Q. Do you know of any other technologies that be used to
13 achieve torque vectoring?
14 A. There are other ways of creating some level of torque
15 vectoring that don't include using dual clutches.
16 Q. What are some of those other ways?
17 A. Well, you can do it with a more traditional differential
18 rear end system by then using the brakes in conjunction
19 with the differential to apply torque on one wheel to
20 enhance the distribution of torque to the other wheel.
21 This was a way in which torque vectoring has been
22 implemented in some commercial vehicles.
23 Q. Do you know when was the first embodiment of torque
24 vectoring in a passenger vehicle?
25 A. I don't know the first commercial production vehicle

1 with torque vectoring, I don't know what that would be.
2 Q. Do you think it was a well known concept prior to the
3 440 patent?
4 MS. SHAH: Objection, form.
5 THE WITNESS: So let's take a couple steps
6 backward or more general. So torque vectoring isn't the
7 only name that this has been -- has been used to
8 describe the ability to control the way that torque is
9 spread to different parts of the system. Torque
10 vectoring is certainly a satisfactory descriptor, but it
11 may have some special meaning that I'm not aware of in
12 2016 that didn't happen in 1998. So I want to be
13 careful not to just assume that what I mean by torque
14 vectoring is what is specifically contained within the
15 GKN system, the Twinstar system, because I've already
16 mentioned there's other ways to generate some control
17 over the torque distribution, so torque vectoring if you
18 want to call it that. So now let's get back to your
19 question. What was your question?
20 BY MS. MANDRUSIAK:
21 Q. Just whether torque vectoring as a general concept was
22 known prior to the 440 patent.
23 A. As a concept, the ability to -- the idea about
24 distributing torque in some controlled way to different
25 wheels, yes, that was known as an idea, as a concept

1 that would be nice to have in a vehicle.
2 Q. Okay. Can I get you to turn to Paragraph 106 of your
3 declaration, please.
4 A. Paragraph 106?
5 Q. Yes. Looking at the first sentence, why do you have
6 "predictable" in quotation marks there?
7 A. So I was trying to distinguish between the lengthy and
8 complicated process that engineers go through to take a
9 concept and through modeling and simulation and testing
10 find out how this device behaves. Sometimes we call
11 that predicting how the device behaves, but it's not
12 predictable before you do the simulation as to what the
13 results are going to be; that's why you do the testing,
14 that's why you do the simulation. So you could perhaps
15 say it's not readily knowable what's going to happen
16 when you mix and match these components together, but I
17 used the word predictable because I understand that that
18 word has some meaning in legal terms so -- and I agree
19 with the sentence that it's -- you know, you just can't
20 take these components and mix and match them and know
21 what's going to happen, it's not predictable, it's not
22 easily knowable. There are methods, lengthy methods for
23 trying to tease this out.
24 Q. Let's talk a little bit about what you mean by what's
25 going to happen. If we, for example, put in the

1 Watanabe rear drive unit into a car, isn't it
2 predictable that it's going to function as it's laid out
3 in Watanabe?
4 MS. SHAH: Objection, form.
5 BY MS. MANDRUSIAK:
6 Q. I understand maybe the parameters of performance might
7 not be readily knowable without modeling, but is the
8 general functionality predictable?
9 A. You know, at least in principle, what the general
10 functioning of a dual clutch rear end is intended to
11 have, but you don't know whether or not it will actually
12 perform that function in a particular realization that
13 is implemented in a vehicle of a particular
14 specification where you're trying to reach particular
15 design goals or specifications that are set out for the
16 vehicle, performance goals. You have no idea whether
17 that will work.
18 BY MS. MANDRUSIAK:
19 Q. Work to meet the design goals, you mean, or work as a
20 clutch?
21 A. I mean I don't think that distinction is meaningful that
22 you're trying to draw. Clearly it has two clutches, and
23 you can make them open and close, and the question is
24 whether or not this will function as a device
25 successfully in a vehicle of a particular design which

1 has certain goals, performance goals, has certain -- so
2 I don't know whether it would or would not until I try
3 it out.
4 Q. Whether it would or not means whether it would or not
5 meet those performance goals?
6 A. I don't know whether it would meet those performance
7 goals, and it could be that it might not even do the
8 basic functioning that you assumed it would. For
9 example, clutches have to be controlled, and so you have
10 to develop the control strategy for -- that's not
11 described in the Watanabe document, so that has to be
12 developed. If you don't do that right, you won't get
13 potentially the functionality that you might think you
14 could get out of such a concept.
15 Q. Does the 440 patent describe the controllers that you
16 would use with the clutches?
17 MS. SHAH: Objection, form.
18 THE WITNESS: Would you rephrase the question,
19 please.
20 BY MS. MANDRUSIAK:
21 Q. Does the 440 patent describe the controllers you would
22 need to use with the clutches?
23 A. I don't understand how that question is different than
24 the first one. It sounds like the same.
25 Q. What part don't you understand? Maybe help me rephrase

1 it.
2 A. Well, I don't know what you're asking me to -- I don't
3 know what perspective you're asking me to assume when
4 I'm reading the patent, and I don't know -- yes, so what
5 kind of perspective do you want me to take?
6 Q. Well, your entire declaration is from the perspective of
7 one skilled in the art and as an expert who is beyond
8 that skill. So from that perspective, does the 440
9 patent describe control strategies that you would use
10 with the clutch system?
11 A. It talks about the control of the clutches and the
12 switched on devices in very general terms, but it does
13 not provide the details of the sensing and control
14 algorithms that would be needed. My understanding is
15 that that detail is provided in a different patent,
16 which I think I do mention in my declaration.
17 Q. So do you think one skilled in the art could practice
18 the 440 patent even without that disclosure in the
19 document?
20 MS. SHAH: Objection, form.
21 THE WITNESS: I think that the -- I think that
22 the patent can be practiced. It shows one of ordinary
23 skill how to organize the concepts, you know, the
24 components, so the type of 2-4 mechanism and the
25 synchronizer that are supposed to be on the primary axis

1 and the advantages of that creates this large shutdown
2 section with this dual clutch rear end, so it is having
3 this large shutdown section which can be implemented,
4 which should give a reduction in losses. And it tells
5 you to -- that you can, you know, work with this
6 invention, that this invention works because of this
7 cooperation between the use of the clutches in the back
8 and the 2-4 switching mechanism in the front. So the
9 goals of the patent, I think, can be practiced by one of
10 ordinary skill.
11 BY MS. MANDRUSIAK:
12 Q. So implementing a control strategy is within the skill
13 level of one skilled in the art if the components are
14 detailed in the patent?
15 A. What I'm saying here is that the patent is focused on
16 providing certain new benefits, new -- some novel
17 contributions, and I talked about what those are, and I
18 just talked about what they are, and I believe that the
19 implementation of those benefits are within the
20 capability of one of ordinary skill in the art. That's
21 a different question than you asked me before. Could
22 somebody take Watanabe's rear end concept and build a
23 working car out of it?
24 Q. Do you think someone could implement the Watanabe
25 patent?

1 MS. SHAH: Objection, form.
2 THE WITNESS: I haven't studied the patent in
3 detail, but the concept which he is contributing is the
4 way that the lubrication of the clutches can be enhanced
5 through his design, and he has provided -- apparently
6 provided ample disclosure about that. I mean I haven't
7 studied it in detail, but he certainly has not disclosed
8 how you could -- and it wasn't the intention of his
9 disclosure from my reading of it to provide a torque
10 vectoring system that has all sorts of torque vectoring
11 control, it's not the purpose of his disclosure.
12 BY MS. MANDRUSIAK:
13 Q. Okay. So kind of veered away from my question, so I'm
14 going to ask it again. So could one skilled in the art
15 implement the Watanabe patent based on the disclosure?
16 MS. SHAH: Objection, form.
17 THE WITNESS: Repeat the question, please.
18 BY MS. MANDRUSIAK:
19 Q. Could one skilled in the art implement the Watanabe
20 patent based on its disclosure?
21 A. Well, I guess that since I haven't studied whether or
22 not that concept is enabled, the patent that is -- or I
23 haven't studied that aspect of it, I'm not in a position
24 to answer it specifically.
25 Q. What makes it different from the 440 patent in terms of

1 disclosure?
2 MS. SHAH: Objection, form.
3 THE WITNESS: I mean I haven't been asked to
4 opine on the 440's -- as to whether it's enabled, and
5 you've asked me some questions about whether one of
6 ordinary skill could practice what's in here, and so
7 within the context of a nonformal analysis of that, I
8 related to you that the novel items that the patent is
9 talking about, it seems to me that there is -- that it
10 would be possible for one of ordinary skill to utilize
11 them. I'm not really at a position to take that further
12 than that.
13 BY MS. MANDRUSIAK:
14 Q. I'm just trying to understand what you mean in
15 Paragraph 108 where you say that Teraoka and Watanabe do
16 not provide or describe the sensors, controllers, and
17 algorithms, and you seem to be saying that that's a
18 reason why one skilled in the art wouldn't combine them.
19 A. Paragraph 108?
20 Q. Uh-huh. Maybe you can explain, maybe I'm
21 misunderstanding your paragraph there.
22 MS. SHAH: Objection, mischaracterizes the
23 testimony.
24 THE WITNESS: So what about Paragraph 108
25 don't you understand or have a question about, what is

1 it?
2 BY MS. MANDRUSIAK:
3 Q. Well, it says the combination of Teraoka with Watanabe
4 would be inoperable without the addition of sensors,
5 controllers and algorithms, and that those are not
6 provided in Teraoka and Watanabe. Isn't that within the
7 skill level of one skilled in the art to implement those
8 additional features?
9 A. Well, maybe so. You have not provided me any
10 information in the petition in the Becker declaration
11 that says how you would do those things or how one of
12 ordinary skill would begin to utilize those clutches.
13 Teraoka is not concerned with that. The technology that
14 Teraoka is talking about is known, and he only moves the
15 placement of his clutch, so it requires a small
16 configurational change of the drive train, but the
17 sensing and control aspects have not really been altered
18 very much, but you are suggesting or it is suggested
19 from the petition that Teraoka should be combined with
20 Watanabe, which is a completely different device
21 operating completely differently than the rear end
22 differential type that Teraoka was using, and it just
23 says it's a simple replacement, and I don't think it's a
24 simple replacement at all, a simple substitution. It's
25 a complex substitution and would require more details as

1 hypothetical question that I don't think is consistent
2 with what a person of ordinary skill is.
3 BY MS. MANDRUSIAK:
4 Q. I understand that's your position. I'm asking you to
5 answer this hypothetical question. One skilled in the
6 art was instructed to combine the teachings of Teraoka
7 and Watanabe. Is it possible in view of their skill
8 set; yes or no?
9 MS. SHAH: Objection, argumentative.
10 THE WITNESS: I think that someone who is
11 looking at Teraoka and wanted to make some improvements
12 on it would not be looking from Teraoka to Watanabe to
13 make those improvements. So that person of ordinary
14 skill in the art doesn't need to be concerned with the
15 complexities of the dual clutch control that would have
16 to be dealt with if one were to combine Watanabe with
17 Teraoka.
18 BY MS. MANDRUSIAK:
19 Q. Are you refusing to answer the question about whether or
20 not it's possible?
21 MS. SHAH: Objection, argumentative, and asked
22 and answered. Take his position.
23 THE WITNESS: I think I've answered the
24 question the best I can.
25

1 to how you would do that, let alone why you would do it,
2 and what details the person would have to take into
3 account in order to do it. None of that is specified in
4 the petition that I can remember so --
5 Q. But is it possible in view of the skill set of one
6 skilled in the art to combine Teraoka and Watanabe?
7 MS. SHAH: Objection, form.
8 THE WITNESS: Well, I don't think that a
9 person looking at Teraoka would look at Watanabe because
10 of its significantly different architecture.
11 BY MS. MANDRUSIAK:
12 Q. I understand that, but is it possible?
13 A. And so --
14 Q. I'm sorry.
15 A. So I -- the person of ordinary skill would not look to
16 that reference, and so I don't see it as a relevant
17 question as to whether or not that person has the skill
18 to utilize the Watanabe concept.
19 Q. Well, I think it's a relevant question. So let's assume
20 that one skilled in the art was instructed to combine
21 these two references. Is it possible in view of the
22 skill set of one skilled in the art to combine Teraoka
23 and Watanabe?
24 MS. SHAH: Objection, form.
25 THE WITNESS: I don't think -- it's sort of a

1 BY MS. MANDRUSIAK:
2 Q. Well, I think that you're maybe missing the point of my
3 question which is let's assume that someone has been
4 instructed to make this combination, so that can bypass
5 your position that someone wouldn't be looking from
6 Teraoka to Watanabe, they have those two documents in
7 hand and they've been instructed to combine them. Is
8 that possible?
9 MS. SHAH: Objection, asked and answered.
10 BY MS. MANDRUSIAK:
11 Q. And if it's not possible, why not?
12 MS. SHAH: Objection, compound. And
13 objection, asked and answered.
14 MS. MANDRUSIAK: I wish there were answers,
15 Sangeeta.
16 MS. SHAH: Well, then you haven't been
17 listening.
18 THE WITNESS: If we remove ourselves from this
19 hypothetical, one of skill in the art, and take an
20 engineer who is knowledgeable about drive train design
21 and control, and instruct that person to take the
22 concept of Teraoka and combine it with Watanabe, is it
23 theoretically possible that a person with sufficient
24 skill could do that? And the answer to that general
25 question would be while they might not want to do that,

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1 it may be outside the purpose of the Teraoka reference.
2 But if they were instructed in your hypothetical to just
3 do it, then they could combine those two references and
4 begin the process of implementing a system with
5 Teraoka's 2-4 mechanism and Watanabe's rear-end device.
6 BY MS. MANDRUSIAK:
7 Q. Okay, thank you. Why don't we take a 10-minute break.
8 (A recess was taken from 3:20 p.m. to 3:33
9 p.m.)
10 BY MS. MANDRUSIAK:
11 Q. Can you please read Paragraphs 114 and 115 of your
12 declaration to yourself.
13 A. Okay.
14 Q. Can you explain how Watanabe would render Teraoka
15 inoperable?
16 MS. SHAH: Objection, mischaracterizes the
17 testimony.
18 BY MS. MANDRUSIAK:
19 Q. Paragraph 115 says the proposed modification of Teraoka
20 with Watanabe would render the reference inoperable.
21 MS. SHAH: Mischaracterized his testimony.
22 THE WITNESS: Yeah, the sentence goes on to
23 say "for its intended purpose -- reducing drag -- the
24 proposed obviousness combination lacks a motivation to
25 combine."

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1 BY MS. MANDRUSIAK:
2 Q. Is that your answer? Are you done?
3 A. I mean I think the answer is in the two paragraphs
4 there. If I can read Paragraph 114 also into the
5 record. "Since the goal of Teraoka is to reduce drag
6 for fuel efficiency purposes, one of ordinary skill in
7 the art would understand that any modification of
8 Teraoka should be done to coincide with the goal of
9 reducing drag. This is consistent with the
10 problem-solution approach to designing driveline
11 systems. However, Watanabe discloses structure that is
12 focused on supplying fluid to the clutches to prevent
13 seizing of the clutches. One of ordinary skill in the
14 art would therefore not be motivated to modify Teraoka
15 based on the teachings of Watanabe as there is no clear
16 indication that doing so would be in line with Teraoka's
17 explicit goal of reducing drag of rotating parts."
18 Q. Okay. So is there any indication that doing so would
19 inhibit Teraoka's goal of reducing drag?
20 MS. SHAH: Objection, form.
21 THE WITNESS: I mean I understand the test to
22 be someone would want to look for somebody who was
23 trying to solve -- would be motivated to make a
24 combination because they were trying to, amongst other
25 things, solve a problem of -- a similar problem. Since

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1 Watanabe doesn't talk about solving the problem of
2 reducing drag but, in fact, improving the clutches so
3 that they don't burn out when they're being used, I
4 don't think one of ordinary skill would look to Watanabe
5 to improve the goal of reducing drag that Teraoka had.
6 BY MS. MANDRUSIAK:
7 Q. Okay. I understand that, but would Watanabe actually
8 render Teraoka inoperable?
9 A. For its intended purpose of reducing drag.
10 Q. How so? Okay. So how would Watanabe render Teraoka
11 inoperable for the purpose of reducing drag?
12 A. So --
13 Q. Are you saying that it would be slightly less fuel
14 efficient?
15 A. The torque vectoring type of dual clutch mechanisms, in
16 fact, do have additional losses associated with them,
17 and I don't think somebody who was trying to make the
18 kind of reduction in drag that Teraoka was doing by
19 changing the position of the clutch that is basically an
20 on/off clutch would go to a radically different concept
21 with the two clutch rear end unit that Watanabe talks
22 about, which are intended to have the clutches dragging
23 all the time when you are trying to vector the torque.
24 It seems completely at odds with the intended purpose
25 that Teraoka had with his invention.

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1 Q. Okay. But in Paragraph 115 you seem to be envisioning
2 that modification as a hypothetical, so I'm just trying
3 to understand if -- maybe inoperable is not the right
4 word. Did you mean maybe less efficient?
5 MS. SHAH: Objection, form.
6 THE WITNESS: It wouldn't -- the idea from
7 Teraoka was to make the operation of the drive train
8 even more fuel efficient by getting rid of the -- or
9 trying to reduce, excuse me, the drag associated with
10 the clutch, and this is an on/off clutch. The idea that
11 by adding clutches that are going to be dragging all the
12 time or all the time that they're vectoring is
13 completely opposite the intended purpose of the Teraoka
14 invention, and, therefore, renders the goal, if you
15 will, of what Teraoka was trying to accomplish as
16 inoperable.
17 BY MS. MANDRUSIAK:
18 Q. Inoperable or just less efficient?
19 MS. SHAH: Objection, asked and answered.
20 THE WITNESS: It seems to me inoperable is a
21 reasonable word. We could argue about different words
22 that might fit there.
23 BY MS. MANDRUSIAK:
24 Q. What's your definition of inoperable, please?
25 A. In this case it's inoperable for its intended purpose,

29 (Pages 110 to 113)

1 so the purpose was to reduce drag, so it would not
2 operate at this reduced drag more efficient state that
3 Teraoka was trying to achieve with the Watanabe type of
4 clutches.
5 Q. But would it still function as a drive train?
6 MS. SHAH: Objection, form.
7 THE WITNESS: That to me is not what I'm
8 saying here. I'm not asking the question whether --
9 this is what we talked about before --
10 BY MS. MANDRUSIAK:
11 Q. Right.
12 A. -- when you asked me to force somebody to make one of
13 these devices by forcing somebody to combine Teraoka
14 with Watanabe. And I'm saying that you wouldn't want to
15 do that, would not want to combine Teraoka with Watanabe
16 because of the purpose that Teraoka has that would be
17 not achieved with Watanabe, so we would not achieve the
18 operational performance that they were looking for, so
19 from that point of view, it's inoperable for its
20 intended purpose.
21 Q. Okay. A little while ago you said -- and I'll read it
22 directly, "I mean I understand the test to be someone
23 would want to look for somebody who was trying to
24 solve -- would be motivated to make a combination."
25 What test were you talking about?

1 MS. SHAH: Objection, form.
2 THE WITNESS: I don't understand what you just
3 read.
4 BY MS. MANDRUSIAK:
5 Q. That was one of your answers. The question I asked was,
6 "Is there any indication that doing so would inhibit
7 Teraoka's goal of reducing drag?" And your answer was,
8 "I mean I understand the test to be someone would want
9 to look for somebody who is trying to solve -- would be
10 motivated to make a combination." So just I'm wondering
11 what test you were referring to in that answer.
12 MS. SHAH: Objection, form.
13 THE WITNESS: I'm afraid that that answer in
14 this short context you've given me here doesn't make
15 much sense. If you want to go back and we can ask the
16 question again, I can try to give a clearer answer.
17 BY MS. MANDRUSIAK:
18 Q. Could it be you were referring to the obviousness test?
19 A. I would prefer to go back and not try to patch.
20 Q. I'm not trying to patch, I'm trying to understand what
21 test you were referring to.
22 A. Well, I just -- we need to go back, then, to that point
23 in the testimony and get me back into the context of
24 that answer and question that was going on at that point
25 so that I can understand what I was trying to say. I

1 apologize for that answer not being very articulate.
2 Q. That's fine. Seems you just can't remember, so we'll
3 move on. Have you ever heard of an obviousness test or
4 that there's a test for obviousness?
5 A. Yes.
6 Q. Do you know whether there is more than one test?
7 A. Well, I'm not an expert in law, but I know there are
8 different factors or different things that can be tested
9 for, if you will. Whether those are different tests or
10 not, I don't know.
11 Q. Before when you were talking about the GKN Twinstar, you
12 mentioned a small weight penalty. Do you know what
13 actually causes the small weight penalty? Is it the
14 clutch system?
15 A. I don't know specifically.
16 Q. Okay. I'm going to move on to the Burrows records.
17 It's previously been marked Exhibit 1004.
18 A. Thank you.
19 Q. Are you familiar with this document? Have you read it
20 in its entirety?
21 A. I have read it -- I have reviewed this document, yes.
22 Q. When was the last time you read it?
23 A. I reviewed it yesterday.
24 Q. Okay. So Burrows discloses three control strategies to
25 transition from 2-wheel drive to 4-wheel drive, correct?

1 Maybe I can help by pointing you to your
2 declaration, Paragraphs 127 through 130, where you
3 summarized the three strategies.
4 A. 127 you said?
5 Q. Starting Paragraph 127, yes.
6 A. I would say that there were at least three control
7 strategies taught by Burrows.
8 Q. Okay. I didn't mean to talk over you. So the first
9 embodiment is summarized in your Paragraph 127, correct?
10 A. Yes.
11 Q. The second embodiment is summarized in Paragraph 128 and
12 129, right?
13 A. Generally, yes.
14 Q. And the third strategy is summarized in Paragraph 130,
15 right?
16 A. Yes.
17 Q. Okay. Can you please turn to Paragraph 146 where you
18 say the Becker Declaration never identifies which of the
19 at least three multi-stage synchronizer mechanisms
20 taught in Burrows would be suitable for combination with
21 Teraoka. Is that still your opinion?
22 A. In Paragraph 146?
23 Q. Uh-huh. Yes.
24 A. Becker Declaration never identifies which of the at
25 least three multi-stage synchronizer mechanisms taught

1 in Burrows would be suitable for combination with
2 Teraoka, or how any of the multi-stage synchronization
3 processes taught in Burrows could be integrated with
4 Teraoka's existing driveline -- which is not directed to
5 ATV applications -- and what other modifications would
6 need to be made thereafter is the complete paragraph.
7 Q. Is that still your opinion?
8 A. Yes.
9 Q. I'm going to hand you a copy of what's previously been
10 marked Exhibit 1005. And I'll ask you to turn to the
11 claim chart in Paragraph 52, please.
12 A. Claim chart. Yes.
13 Q. Okay. Can you see the portion where Mr. Becker -- the
14 second paragraph where it says -- in the claim chart I
15 mean -- the main drive shaft 23 transmits torque to a
16 free running differential 40 which includes a dog
17 clutch, and he cites to Exhibit 1004, Page 7, Line 21 to
18 Page 8, Line 5. Do you see that?
19 A. Yes.
20 Q. Does that correspond to the second embodiment described
21 in your Paragraph 128?
22 A. I'm talking about internal, external page numbers here.
23 Should be external right?
24 Q. External Page 8, I believe, yes.
25 A. I don't think --

1 Q. I'll point out the citation that continues on to the
2 next page in the Becker declaration where it refers to
3 Page 8 line 7 to 11. Is that the same Page 8 line 7 to
4 11 cited in your Paragraph 128?
5 A. Again, so I'm just trying to find -- this isn't really a
6 quote, but he says it's in Page 7, Line 21.
7 Q. Uh-huh.
8 A. And these are external numbers.
9 Q. Let's move on to the quotation because that'll be easier
10 to match up with that. The sentence starts Burrows
11 discloses.
12 A. Yes.
13 Q. And then the quotation marks, I think that's the exact
14 quotation in your Paragraph 128, right?
15 A. A control strategy, blah, blah, blah, blah, and
16 where is this -- there's not even a cite for this -- oh,
17 yes, there is, sorry, Page 8, Line 7 through 11, Page 8,
18 Line 7 through 11, 5, 6, 7 -- so this is not the right
19 numbering. I think it may be the internal numbers,
20 right?
21 Q. Okay, maybe so.
22 A. Well, I can't find it if I don't have the right numbers.
23 Q. I'm asking you to compare your Paragraph 128, so please
24 put down the Burrows document.
25 A. Well, I just want to make sure his referencing of the

1 Burrows is correct in the first place.
2 Q. Okay.
3 A. He's referring to the internal numbers, not the external
4 numbers. Okay. And now you want me to compare that to
5 the --
6 Q. The quotation in your Paragraph 128.
7 A. Okay.
8 Q. Okay. So you previously testified that your
9 Paragraph 128 is talking about the second embodiment in
10 Burrows.
11 A. Yes.
12 Q. Is it still your opinion that Mr. Becker doesn't explain
13 which embodiment he's combining with Teraoka?
14 A. He doesn't explain how this is meeting the claim
15 limitation. If you look at --
16 Q. I'm going to stop you. That's not my question. My
17 question was --
18 MS. SHAH: Objection, argumentative. Let him
19 finish. He was in the middle of a sentence. You don't
20 get to cut him off.
21 MS. MANDRUSIAK: Sure, I can.
22 MS. SHAH: No, you can't.
23 MS. MANDRUSIAK: Sure, I can.
24 MS. SHAH: There's a certain code of civility.
25 You let the witness actually complete their thought

1 process.
2 MS. MANDRUSIAK: I was just trying to be more
3 efficient.
4 MS. SHAH: It's at least the third time that
5 you literally cut him off midstream of a sentence.
6 Please don't do it again.
7 THE WITNESS: So I was saying --
8 BY MS. MANDRUSIAK:
9 Q. Please continue.
10 A. -- that this particular claim chart here, he's trying to
11 show that he's practicing Claim Number 6, and I don't
12 believe that this description here of utilizing this
13 second control strategy shows that the combination of
14 Teraoka and Burrows is practicing Claim 6, and
15 specifically because the speed synchronization is
16 required to be in the switch-on mechanism, and the
17 switch-on mechanism is on the primary axle, and that's
18 not the case with the Teraoka/Burrows combination.
19 Q. Okay. So looking at your Paragraph 146, the first
20 phrase says the Becker Declaration never identifies
21 which of the at least three multi-stage synchronizer
22 mechanisms taught in Burrows would be suitable for
23 combination. Do you still agree with that statement?
24 MS. SHAH: Objection, form.
25 THE WITNESS: The sentence continues or how

1 any of the multi-stage synchronization processes taught
2 in Burrows could be integrated with Teraoka's existing
3 driveline, which is not directed to ATV, and what other
4 modifications need to be made. So there is an or and
5 then part of that has two additional phrases.
6 BY MS. MANDRUSIAK:
7 Q. Okay. So you still maintain that that entire sentence
8 is accurate?
9 A. It says that the mechanism that he describes here is not
10 suitable for combination with Teraoka -- or how any of
11 these multi-stage synchronization processes taught in
12 Burrows could be integrated with Teraoka, which is not
13 directed to ATV, nor what other modifications need to be
14 made thereafter, and although I don't also say it
15 explicitly here, as I said just a few minutes ago, it
16 also doesn't meet the claim.
17 Q. Well, would you agree that Mr. Becker identifies the
18 second embodiment from Burrows?
19 A. I would say that it's true that he identifies that
20 control strategy, but it's not suitable.
21 Q. Thank you.
22 A. So my statement and my response about that statement
23 holds, that is an accurate statement.
24 Q. Okay. So please turn to Paragraph 126 and we'll talk
25 about ATV. The second sentence of that paragraph says

1 all-terrain vehicles (ATVs) are designed for aggressive
2 off-road 4-wheel drive capability, in which the driver
3 straddles a seat and uses handlebars for steering.
4 A. That's often the way that all-terrain vehicles are
5 configured.
6 Q. Okay. Do you know of any ATVs where the driver
7 straddles the seat and uses handlebars for steering that
8 have a longitudinally mounted engine?
9 MS. SHAH: Objection, form.
10 THE WITNESS: Could you repeat the question,
11 please.
12 BY MS. MANDRUSIAK:
13 Q. Sure. Do you know of any ATVs where the driver
14 straddles the seat and uses handlebars for steering that
15 have a longitudinally mounted engine?
16 MS. SHAH: Same objection.
17 THE WITNESS: So as I sit here, as I prepare
18 for the deposition, I didn't study and review all the
19 different types of ATVs and their configurations of
20 drive train components, so I can't say definitively as I
21 sit here that such a configuration exists or doesn't
22 exist.
23 BY MS. MANDRUSIAK:
24 Q. But you can't think of any right now, right?
25 MS. SHAH: Asked and answered.

1 THE WITNESS: I think I answered your
2 question.
3 BY MS. MANDRUSIAK:
4 Q. Okay. You can answer it again for the record.
5 A. I think it's on record. Why don't you read back my
6 answer.
7 MS. SHAH: Objection, asked and answered
8 argumentative.
9 MS. MANDRUSIAK: Can you think of any ATVs
10 where the driver straddles the seat and uses handlebars
11 for steering with a longitudinally mounted engine, "yes"
12 or "no," and I understand you can add a caveat if you
13 wish.
14 THE WITNESS: Yeah, I said that I did not
15 prepare for this declaration with the idea of studying
16 all the different ATVs that are out there and their
17 different configurations, so as I sit here right now,
18 I'm not aware that there is or is not a longitudinally
19 mounted engine in one of the ATVs that is produced.
20 BY MS. MANDRUSIAK:
21 Q. Okay. Do you know of any ATVs where the driver
22 straddles the seat and uses handlebars for steering
23 where the vehicle has a front engine with a permanent
24 drive to the rear wheels and a disconnectible drive to
25 the front wheels?

1 A. So I don't understand your question, what is the
2 configuration that you're detailing?
3 Q. Front engine with a permanent drive to the rear wheels
4 and a disconnectible drive to the front wheels.
5 MS. SHAH: Objection, form.
6 THE WITNESS: Can you show me such a
7 configuration in Burrows, for example?
8 BY MS. MANDRUSIAK:
9 Q. I'm asking you if you know of any ATVs with that
10 configuration.
11 A. But I'm trying to understand what you are describing. I
12 don't understand what you're describing.
13 Q. Okay. Do ATVs generally have a transverse engine?
14 MS. SHAH: Objection, form.
15 THE WITNESS: I haven't studied the
16 demographics or the -- not the demographics but
17 categorized all the ATVs to be able to answer that
18 question specifically.
19 BY MS. MANDRUSIAK:
20 Q. The ATVs that you know of, understanding you haven't
21 studied every ATV, do they have transverse engines?
22 MS. SHAH: Objection, form.
23 THE WITNESS: So would you repeat your
24 question, please.
25

1 BY MS. MANDRUSIAK:
2 Q. Of the ATVs that you know of, do they have transverse
3 engines or longitudinal engines? I changed it a little
4 bit.
5 MS. SHAH: Same objection.
6 THE WITNESS: I would say that I can't answer
7 that question as I sit here, just don't recall
8 specifically enough the details of different ATVs I've
9 had involvement with, don't remember.
10 BY MS. MANDRUSIAK:
11 Q. Okay. What would you characterize the purpose of
12 Burrows as?
13 A. It's pretty clear from his own reference, so the Burrows
14 reference is intended to develop strategies that ensure
15 the transition to engagement of 4-wheel drive occurs in
16 a two stage process with the intent of reducing any
17 acceleration or jerk that would be perceived by the
18 driver. More generally, the idea is that he wants to be
19 able to engage the 4-wheel drive system under dynamic
20 conditions, under aggressive driving conditions, and he
21 comes up with a strategy for being able to reconnect the
22 4-wheel drive, the system into 4-wheel drive in a way
23 that tends to be a smooth transition for the driver so
24 the driver doesn't feel a jerk, as he puts it, when the
25 4-wheel drive is engaged.

1 Q. Does Burrows use the phrase aggressive driving?
2 A. I don't see the word aggressive driving used explicitly.
3 I just briefly went through, one of ordinary skill
4 reading this would clearly understand that all terrain
5 vehicles are used as devices for going on all terrains
6 and/or off-roading as it's often called, and one need
7 only go to a place where these vehicles are being driven
8 off-road to observe the kind of driving behavior that is
9 there. I think you could agree that this would be
10 considered aggressive driving behavior, they are meant
11 to be vehicles that are fun to drive as well as being
12 able to accommodate various conditions. And Burrows'
13 ideas here are responsive to the fact that the vehicle
14 may need to engage in the 4-wheel drive system during a
15 period of time when the vehicle is accelerating and
16 maybe accelerating harshly, and the strategies for
17 engaging the 4-wheel drive system have to account for
18 the fact that the vehicle's accelerating. He has
19 sensors in here that measure the acceleration, he has
20 timing for the engagement which is dependent on how fast
21 and what the acceleration is of the vehicle, so he's
22 trying to make it possible so that these vehicles can
23 seamlessly go into 4-wheel drive under these aggressive
24 driving circumstances. This is in direct contrast to
25 Teraoka, which is intended to change into the 4-wheel

1 drive mode when the vehicle is stationary.
2 Q. Is it your opinion that Burrows is directed to ATVs
3 where the driver straddles the seat and uses handlebars
4 for steering?
5 A. He says that this invention relates to drivelines for
6 motor vehicles and in particular for motor vehicles such
7 as all-terrain vehicles which have selective 2-wheel
8 drive or 4-wheel drive.
9 Q. Can the phrase all-terrain vehicles mean passenger cars?
10 MS. SHAH: Objection, form.
11 THE WITNESS: I don't know what you mean can,
12 is it -- in my experience one of ordinary skill would
13 understand an all-terrain vehicle and a passenger
14 vehicle being very different kinds of vehicles.
15 BY MS. MANDRUSIAK:
16 Q. Okay. I'm going to give you a new exhibit. Can we mark
17 this please as Exhibit 1011.
18 STEIN DEPOSITION EXHIBIT NUMBER 1011,
19 LAND ROVER DOCUMENT
20 WAS MARKED BY THE REPORTER
21 FOR IDENTIFICATION
22 BY MS. MANDRUSIAK:
23 Q. I'll draw your attention to the last paragraph on that
24 page. And I'll read it into the record. It says,
25 "Around this time, Rover started to develop a new

1 all-terrain vehicle, inspired by the American Jeep." Is
2 all-terrain vehicle here used to mean a passenger car as
3 opposed to a small handlebar driven vehicle?
4 MS. SHAH: Objection, form.
5 THE WITNESS: You're mischaracterizing my
6 testimony in that I did not say that all all-terrain
7 vehicles have handlebars.
8 BY MS. MANDRUSIAK:
9 Q. Okay. So could Burrows be referring to Land Rovers?
10 MS. SHAH: Objection, form.
11 THE WITNESS: So again your question is,
12 please?
13 BY MS. MANDRUSIAK:
14 Q. Could Burrows be referring to a Land Rover when it says
15 all-terrain vehicle?
16 MS. SHAH: Same objections.
17 THE WITNESS: I don't really understand your
18 question. What type of Land Rover?
19 BY MS. MANDRUSIAK:
20 Q. Any type of Land Rover.
21 MS. SHAH: Objection, form.
22 THE WITNESS: I don't know how to answer your
23 question, then.
24 BY MS. MANDRUSIAK:
25 Q. What don't you understand?

1 MS. SHAH: Objection, argumentative.
2 THE WITNESS: Land Rover comes in all sorts of
3 different various models, and are you talking about Land
4 Rover in the 19 -- late 1940s that this article is
5 referring to or are you referring to Land Rovers that
6 you can buy today that are -- can come in forms of what
7 we call in this country sports utility vehicles which
8 are largely not completely really for on-road use or
9 largely almost always used for on-road use, and I don't
10 think that is the kind of vehicle that Burrows is
11 referring to when he's referring to an all-terrain
12 vehicle. And the reason I say that is because of the
13 kinds of -- first of all, using that terminology, but,
14 also, because when you look at the strategy and the
15 control strategy that he's talking about, he's talking
16 about someone driving a vehicle aggressively and wanting
17 to engage 4-wheel drive during aggressive driving
18 scenarios, and that's -- so I don't think he was
19 referring to what people do typically with SUVs in this
20 country which is the driving to work.
21 BY MS. MANDRUSIAK:
22 Q. Can you please look at the first page of the Burrows
23 document, the cover page, I mean. Do you see that the
24 applicant is Ford Global Technologies and that the agent
25 is Land Rover? Do you see that?

1 A. I see that the agent and/or address for service is Land
2 Rover, yes.
3 Q. Does that change your opinion whether or not Burrows
4 could be encompassing sport utility vehicles?
5 MS. SHAH: Objection, form.
6 THE WITNESS: I think the -- that is not --
7 it's only a guess that all-terrain vehicles when Burrows
8 uses that term in the second sentence of his disclosure
9 that he's referring to Rover, Land Rover vehicles. I
10 don't know whether that's true or not. I do know that
11 the description of the art that he introduces here is
12 for aggressive off-road. And could you use a Land Rover
13 for doing that? Theoretically possible.
14 BY MS. MANDRUSIAK:
15 Q. Which description were you referring to when you said
16 the aggressive off-road?
17 A. I was referring to the algorithm which tries to account
18 for the vehicle speed, the acceleration of the vehicle
19 as two examples, the fact that the amount of time that
20 the algorithm takes to engage the 4-wheel drive system
21 once it engages the first clutch before engaging the
22 second clutch has to do with the vehicle speed and
23 acceleration, with the idea that when you're
24 accelerating more harshly and going faster, it takes
25 more time to get things synchronized, and he's

1 accommodating this, and this all makes sense that he's
2 trying to make it possible to synchronize the 4-wheel
3 drive system to engage it when the vehicle is being
4 driven aggressively.
5 Q. Could those algorithms be used in a sport utility
6 vehicle like a Land Rover?
7 MS. SHAH: Objection, form.
8 THE WITNESS: I mean this comes down to the
9 question that we were talking about before in terms of
10 driveline design and what are you trying to accomplish
11 with your -- what are the goals of your vehicle, and so
12 what kind of tradeoffs are you willing to make? So is
13 it possible to include the Burrows invention in a
14 4-wheel drive system that's driven by a little old man
15 to the supermarket every week as the sole use of the
16 vehicle? Of course, you can do that. It could be
17 implemented, if your market was for that type of driver,
18 for sedate driver, then this technology would be wasted
19 in that situation.
20 BY MS. MANDRUSIAK:
21 Q. Can you look at Figure 1 of Burrows, please. What is
22 referenced in row 11?
23 A. In Figure 1 of Burrows?
24 Q. Yes.
25 A. Well, it looks like it's pointing to the engine.

1 Q. Okay.
2 A. But I have to check. I don't have my -- yeah, engine
3 11.
4 Q. What's referenced in row 18?
5 A. The gearbox.
6 Q. Okay. What are the circles in the engine representative
7 of?
8 MS. SHAH: Objection, form.
9 THE WITNESS: What are the circles in the
10 engine for?
11 BY MS. MANDRUSIAK:
12 Q. Representative of?
13 A. I would assume they are a, you know, a representation of
14 the cylinders in the engine.
15 Q. So this would be a 6 cylinder front transverse engine,
16 right?
17 MS. SHAH: Objection, form.
18 THE WITNESS: I don't know that he describes
19 it as a 6 cylinder engine, and I don't know how he
20 describes the orientation of this particular powertrain,
21 so why don't we just go to that instead of guessing
22 based on the circles.
23 BY MS. MANDRUSIAK:
24 Q. Sure. I just assumed that you would be able to
25 understand what the figure represented.

1 MS. SHAH: Argumentative, unnecessary.
2 MS. MANDRUSIAK: Please refer to the section
3 in the document.
4 THE WITNESS: So it says that it's a
5 transversely mounted diesel engine or gasoline engine
6 mounted transversely at the front of the vehicle, which
7 is what is shown.
8 BY MS. MANDRUSIAK:
9 Q. Okay. Do you know of any ATVs, and by ATVs I mean
10 uncovered off-road vehicles straddled with handlebars,
11 using ATVs, that have a front transverse 6 cylinder
12 engine like that?
13 MS. SHAH: Objection, form.
14 THE WITNESS: I've already said that
15 all-terrain vehicles don't just come with handlebar
16 steering, there are bigger all-terrain vehicles, and I'm
17 not aware of all of the configurations and engine sizes
18 that are in these vehicles. I work with, for example,
19 all-terrain vehicles of the type that the military uses
20 called Humvees, and they're diesel engines and they're 8
21 cylinders. So ATVs can come in a lot of different
22 looking packages, but the idea of an all-terrain
23 vehicle, especially one that needs -- is that it, as
24 envisioned by Burrows, is that we want to be able to
25 dynamically engage the powertrain, so taking into

1 account acceleration of the vehicle, the velocity of the
2 vehicle, and there's other things listed, is his goal to
3 be able to accommodate that. And so I can tell you that
4 Humvees are also driven very aggressively and they're
5 big and they have big engines and they're meant to be a
6 vehicle that can go all-terrain.
7 BY MS. MANDRUSIAK:
8 Q. Could a vehicle like a Land Rover be used on a safari in
9 an aggressive driving manner?
10 MS. SHAH: Objection, form.
11 THE WITNESS: You know, Land Rovers in the
12 earlier part of the 20th century were, as I understand
13 it, the vehicle of choice for safaris.
14 BY MS. MANDRUSIAK:
15 Q. Could you imagine a safari involving an aggressive
16 driving scenario?
17 A. Yes.
18 MS. SHAH: Objection, form.
19 BY MS. MANDRUSIAK:
20 Q. Can you think of any sports utility vehicles that have
21 the engine configuration of Figure 1?
22 MS. SHAH: Objection, form.
23 THE WITNESS: So I don't understand your
24 question and, in fact, Burrows is fairly clear at the
25 end of his disclosure page, external number, Page 12,

1 starting at Line 18, "Although in the examples described
2 above the vehicle has a transverse front engine with a
3 permanent drive to the front wheels and a disconnectable
4 drive to the rear wheels, the invention is equally
5 applicable vehicles with a longitudinally mounted engine
6 or where the vehicle has a front engine with a permanent
7 drive to the rear wheels and a disconnectable drive to
8 the front wheels. Indeed the invention is applicable
9 irrespective of the position of the engine, for example,
10 it may be applied to a vehicle having a rear engine with
11 a permanent drive to the rear wheels and a
12 disconnectable drive to the front wheels."
13 So I haven't made any claims that relate
14 specifically to the orientation of the engine, and it
15 seems to me that Burrows is saying that the orientation
16 of the engine is not significant to his invention.
17 BY MS. MANDRUSIAK:
18 Q. So is Burrows saying that his invention could be applied
19 to vehicles with all these types of engineering
20 orientations?
21 A. Yes, he's saying that it does.
22 Q. Okay. So does the discussion we just had change any of
23 the opinions in your report? And, for example, I'll
24 draw you to Paragraph 140.
25 A. So I stand by what Paragraph 140 says.

1 Q. How about we take a five-minute break?
2 A. Okay.
3 Q. I'm close to being done.
4 (A recess was taken from 4:41 p.m. to 4:53
5 p.m.)
6 BY MS. MANDRUSIAK:
7 Q. Can you please turn to Paragraph 160 of your report,
8 your declaration. And the last sentence is what I'm
9 going to ask a question about.
10 A. Okay.
11 Q. Where did you get the information about the Twinstar
12 slated for introduction in these 24 vehicle launches?
13 A. That was represented to me by counsel I'm working with,
14 and I don't know the source of that information.
15 Q. Okay. Do you know how many all-wheel drive vehicles are
16 launched every year?
17 MS. SHAH: Objection, form.
18 THE WITNESS: I mean clearly that's not my
19 area of expertise, and I don't know the answer to that.
20 BY MS. MANDRUSIAK:
21 Q. Do you know if these 24 vehicle launches refers to 24
22 separate and distinct vehicle launches or if it also
23 includes model year launches of the same vehicle?
24 A. I don't know.
25 Q. In Paragraph 161 you are referring to the PACE award.

1 Do you know how the PACE awards are given out?
2 MS. SHAH: Objection, form.
3 THE WITNESS: I am unaware of the specific
4 details regarding the selection process under the PACE
5 award.
6 BY MS. MANDRUSIAK:
7 Q. Would it surprise you to know that GKN nominated itself?
8 MS. SHAH: Objection, form.
9 THE WITNESS: It wouldn't surprise me that
10 many awards that I know that people received have --
11 they've received not because they selfnominated but
12 their name was in the running because they put their
13 name in, so I don't see anything wrong with putting your
14 name in for consideration. I have no idea, though,
15 whether they did or not.
16 BY MS. MANDRUSIAK:
17 Q. Okay. I'm going to give you what's previously been
18 marked as Exhibit 2005. Are you familiar with this
19 document?
20 A. I can't be positive, but I don't think I have seen this
21 particular document before. I've looked at a lot of
22 powertrain documents, but I don't think I have seen this
23 one.
24 Q. Okay. Are you familiar with the particular vehicle
25 that's referred to in this document?

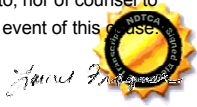
1 A. The Acura RL?
2 Q. Yes.
3 A. I'm pretty familiar with vehicles in general, and I know
4 the Acura line generally speaking. The RL is familiar
5 but -- you know, so generally speaking, yes.
6 Q. Okay. Do you know if any portion of this driveline is
7 shut down when it's in 2-wheel drive mode?
8 A. I don't have any idea about what's coming out here. I
9 haven't studied it.
10 Q. Okay. Can you describe generally the preparation of
11 your declaration?
12 A. I prepared for the declaration by reading the 440
13 patent, I read the petition of -- that was submitted to
14 the Patent Office, and I read the articles, the
15 materials that are listed. I had some discussions with
16 Ms. Shah and one of her associates, and put together
17 ideas, and out of those ideas, created this declaration.
18 Q. When you say created this declaration, do you mean that
19 you literally wrote every word or was it a collaborative
20 process with counsel?
21 MS. SHAH: Objection, form.
22 THE WITNESS: So could you rephrase the
23 question, please.
24 BY MS. MANDRUSIAK:
25 Q. Did you write this document, every word of this

1 document, or was it a collaborative process with
2 counsel?
3 A. I worked with counsel on the ideas. I wrote up sections
4 of my understanding of different issues, and I also
5 talked about the organization of the document, and there
6 was some collaboration on the writing particularly of
7 the legal aspects of it, things that were -- my
8 understanding, some of those were written by me but some
9 of them were written by counsel but reviewed by me,
10 edited by me, every word of this has been edited by me.
11 Q. Sure. Is there any particular reason you didn't include
12 a section explaining the legal standard for obviousness?
13 A. Is there a reason for leaving it out?
14 Q. (Nods head.)
15 A. There's no specific reason for leaving it out.
16 Q. Do you know what factors are to be considered in an
17 obviousness analysis?
18 A. I'm generally aware of those and have discussed that
19 with counsel and have read those factors before.
20 Q. Well, what's your general understanding, please?
21 A. I'm not sure I'm in a position to just tell you what
22 those are off the top of my head, but I do -- I can --
23 because I'm not a legal expert, but I believe some of
24 those are listed in some of the documents that we have
25 here, I can look at those and we can go over them.

1 Q. That's fine. I'm just wondering if you could recall
2 what sort of things you had considered. Do you think
3 that prior art has to be directed to the same problem to
4 be solved in order to be combined?
5 MS. SHAH: Objection, calls for a legal
6 conclusion.
7 THE WITNESS: That's my understanding, that
8 that would require a legal conclusion to answer that
9 question.
10 BY MS. MANDRUSIAK:
11 Q. But that's -- your entire declaration is about combining
12 prior art references.
13 A. Yes.
14 Q. So --
15 A. Not the entire, but I do talk about combining prior art
16 references, and I talk about motivation to combine.
17 Q. So were you informed that prior art has to be directed
18 to the same problem in order to be combined?
19 MS. SHAH: Objection, form.
20 THE WITNESS: It is my understanding that that
21 is part of the requirement or it's part of what is
22 looked at but is not a hard and fast requirement, as I
23 understand it.
24 BY MS. MANDRUSIAK:
25 Q. Does the prior art need to provide motivation to combine

1 the references?
2 MS. SHAH: Objection, form.
3 THE WITNESS: I guess it seems like that's the
4 same question you just asked me, maybe it's my lack of
5 understanding of these legal issues. Isn't it the same
6 question you just asked me?
7 BY MS. MANDRUSIAK:
8 Q. The first question I asked about being directed to the
9 same problem to be solved, and this question I asked
10 whether the prior art needs to provide motivation. So
11 I'll ask it again just to be clear. So does the prior
12 art need to provide motivation in order to be combined?
13 MS. SHAH: Objection, form.
14 THE WITNESS: Again, this requires a legal
15 opinion, but my understanding is that while that's part
16 of what one might look for for making an obviousness
17 argument, it's not in itself a requirement for it to be
18 in the -- I guess you would say the prior art document,
19 the primary reference.
20 BY MS. MANDRUSIAK:
21 Q. Have you ever heard of the KSR case?
22 A. Yes.
23 Q. Did you consider the KSR case in developing your
24 opinions?
25 A. What does that mean?

1 Q. Were any of the holdings of KSR relevant to your
2 opinions?
3 MS. SHAH: Objection, form. He is here as a
4 technical expert, just to clarify.
5 THE WITNESS: So I'm aware of the KSR ruling,
6 and I've talked about that with counsel, and they
7 represent the law to me as it is, and they certainly are
8 aware of the KSR ruling and --
9 BY MS. MANDRUSIAK:
10 Q. I would hope so.
11 A. So does that answer your question?
12 Q. Sure, yes. Have you had any substantive conversations
13 with counsel regarding your testimony throughout the
14 day?
15 A. Today?
16 Q. Yes.
17 A. No.
18 Q. No? Okay. With that, we have no further questions.
19 MS. SHAH: And I have no redirect.
20 MR. BAKER: Thank you very much.
21 MS. MANDRUSIAK: Thank you very much, Dr.
22 Stein.
23 (The deposition was concluded at 5:09 p.m.)
24
25

1 CERTIFICATE OF NOTARY
2
3 STATE OF MICHIGAN)
4) SS
5 COUNTY OF OAKLAND)
6 I, Laurel A. Frogner, Certified Shorthand Reporter,
7 a Notary Public in and for the above county and state,
8 do hereby certify that the above deposition was taken
9 before me at the time and place hereinbefore set forth;
10 that the witness was by me first duly sworn to testify
11 to the truth, and nothing but the truth, that the
12 foregoing questions asked and answers made by the
13 witness were duly recorded by me stenographically and
14 reduced to computer transcription; that this is a true,
15 full and correct transcript of my stenographic notes so
16 taken; and that I am not related to, nor of counsel to
17 either party nor interested in the event of this case.
18 
19
20
21 Laurel A. Frogner, CSR-2495, RMR, CRR
22 Notary Public,
23 Oakland County, Michigan
24 My Commission expires: 4-22-2022
25

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