

1 S. Becker

2 UNITED STATES PATENT AND TRADEMARK OFFICE  
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD  
4

5  
6 JTEKT CORPORATION

7 Petitioner

8 v.

9 GKN AUTOMOTIVE LTD.

10 Patent Owner  
11

12 Case No. IPR2016-00046

13 Patent No. 8,215,440  
14

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16  
17 DEPOSITION OF STEVEN J. BECKER

18 Alexandria, Virginia

19 June 2, 2016  
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23

24 Reported by: Mary Ann Payonk

25 Job No. 107969

<p style="text-align: right;">Page 2</p> <p>1 S. Becker</p> <p>2</p> <p>3</p> <p>4</p> <p>5 June 2, 2016</p> <p>6 9:06 a.m.</p> <p>7</p> <p>8 Deposition of STEVEN J. BECKER, held at</p> <p>9 the offices of Oblon, McClelland, Maier &amp;</p> <p>10 Neustadt, LLP, 1940 Duke Street, Alexandria,</p> <p>11 Virginia, pursuant to Notice before Mary Ann</p> <p>12 Payonk, Nationally Certified Realtime Reporter</p> <p>13 and Notary Public of the District of Columbia,</p> <p>14 Commonwealth of Virginia, and State of New</p> <p>15 York.</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>	<p style="text-align: right;">Page 3</p> <p>1 S. Becker</p> <p>2 APPEARANCES:</p> <p>3 ON BEHALF OF PETITIONER:</p> <p>4 LISA MANDRUSIAK, ESQUIRE</p> <p>5 RYAN SMITH, ESQUIRE</p> <p>6 OBLON, McCLELLAND, MAIER &amp; NEUSTADT</p> <p>7 1940 Duke Street</p> <p>8 Alexandria, Virginia 22314</p> <p>9</p> <p>10 ON BEHALF OF PATENT OWNER:</p> <p>11 SANGEETA SHAH, ESQUIRE</p> <p>12 KRISTIN MURPHY, ESQUIRE</p> <p>13 BROOKS KUSHMAN</p> <p>14 1000 Town Center</p> <p>15 Southfield, MI 48075</p> <p>16</p> <p>17 ALSO PRESENT:</p> <p>18 JENNIFER BRUMBAUGH, ESQUIRE</p> <p>19 Deputy Director of Intellectual Property</p> <p>20 GKN</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p>
<p style="text-align: right;">Page 4</p> <p>1 S. Becker</p> <p>2 STEVEN J. BECKER,</p> <p>3 called as a witness, having been duly</p> <p>4 sworn, was examined and testified as</p> <p>5 follows:</p> <p>6 EXAMINATION</p> <p>7 BY MS. SHAH:</p> <p>8 Q. Good morning, Mr. Becker.</p> <p>9 A. Good morning.</p> <p>10 Q. How many times have you been deposed</p> <p>11 before?</p> <p>12 A. I've testified in the ballpark of</p> <p>13 about 25 times.</p> <p>14 Q. Okay. So I assume you're old hat at</p> <p>15 all these rules. And would you like a quick</p> <p>16 refresher on sort of the protocol for today?</p> <p>17 A. I'm fine.</p> <p>18 Q. Okay. So I guess if you can take us</p> <p>19 through your background and what your -- like,</p> <p>20 your current employment.</p> <p>21 A. Sure. I currently work for Robson</p> <p>22 Forensic and Fournier Robson. At Robson</p> <p>23 Forensic I perform investigations for clients,</p> <p>24 often related to litigation matters, mostly</p> <p>25 related to vehicle work, also related to</p>	<p style="text-align: right;">Page 5</p> <p>1 S. Becker</p> <p>2 videography work, photogrammetry, acoustics,</p> <p>3 and other mechanical engineering aspects.</p> <p>4 Q. I'm sorry, that's --</p> <p>5 A. At --</p> <p>6 Q. Okay, continue.</p> <p>7 A. At Fournier Robson, I do direct</p> <p>8 engineering consulting where we either design</p> <p>9 products or provide testing services for</p> <p>10 clients.</p> <p>11 Q. Is there a relationship between</p> <p>12 Fournier Robson and -- I'm sorry, is it Robson</p> <p>13 Forensic?</p> <p>14 A. Yeah. They're like sort of the same</p> <p>15 company but just a -- the one side's different</p> <p>16 liability than the other side.</p> <p>17 Q. Okay. And so in -- in the context</p> <p>18 of -- I guess what's the split of your time</p> <p>19 between Fournier Robson and Robson Forensic?</p> <p>20 A. Yeah, I -- I have about 10 percent to</p> <p>21 20 percent, depending on the year, direct</p> <p>22 engineering consulting.</p> <p>23 Q. Okay.</p> <p>24 A. And then in my forensics work I have</p> <p>25 about 60 percent plaintiff and 40 percent</p>

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<p>1 S. Becker</p> <p>2 defense.</p> <p>3 Q. All right. And you've been doing</p> <p>4 that for how long, the forensics work?</p> <p>5 A. Since 2009.</p> <p>6 Q. And about how many -- how many times</p> <p>7 have you been retained as an expert through</p> <p>8 that period?</p> <p>9 A. Ballpark, around 300.</p> <p>10 Q. And would you say you mostly do --</p> <p>11 I'm sorry, did you say mostly plaintiffs work?</p> <p>12 A. Again, 60 percent plaintiffs and</p> <p>13 40 percent defense.</p> <p>14 Q. Okay. Have you ever been involved in</p> <p>15 an -- in an intellectual property litigation</p> <p>16 before?</p> <p>17 A. Yes.</p> <p>18 Q. And in what capacity were you</p> <p>19 involved before?</p> <p>20 A. As an expert.</p> <p>21 Q. And what case was that?</p> <p>22 A. It was related to a rear</p> <p>23 differential.</p> <p>24 Q. Okay.</p> <p>25 A. I don't know the status of the case</p>	<p>1 S. Becker</p> <p>2 so I can't get into the details of the case.</p> <p>3 Q. What's the title of the case?</p> <p>4 A. It was related to ARB, and it was a</p> <p>5 rear axle disconnect.</p> <p>6 Q. I'm sorry, related -- is ARB the</p> <p>7 company --</p> <p>8 A. ARB's --</p> <p>9 Q. -- that hired you?</p> <p>10 A. -- the company, correct. No, they're</p> <p>11 not the company that hired me. They're --</p> <p>12 they're --</p> <p>13 Q. It's the company --</p> <p>14 A. They owned a patent.</p> <p>15 Q. I see.</p> <p>16 A. I got hired by an attorney I don't</p> <p>17 recall.</p> <p>18 Q. At what firm?</p> <p>19 A. I don't have that in front of me.</p> <p>20 Q. How long ago were you a patent</p> <p>21 expert?</p> <p>22 A. Two to three years ago.</p> <p>23 Q. And that was for District Court</p> <p>24 litigation --</p> <p>25 A. I wouldn't --</p>
Page 8	Page 9
<p>1 S. Becker</p> <p>2 Q. -- if you know?</p> <p>3 A. -- know.</p> <p>4 Q. So you were deposed?</p> <p>5 A. No.</p> <p>6 Q. And with the work that you do at</p> <p>7 Robson, is most of that sort of related to --</p> <p>8 well, I guess describe for me what the majority</p> <p>9 of that work entails.</p> <p>10 A. Sure.</p> <p>11 Q. The sort of subject matter.</p> <p>12 A. Yeah. The primary subject matter,</p> <p>13 vehicle crashes or products liability.</p> <p>14 Q. Okay. Have you -- have you handled</p> <p>15 any driveline-related sort of subject matter</p> <p>16 cases at Robson?</p> <p>17 A. Definitely, yes.</p> <p>18 Q. And can you describe some of that</p> <p>19 work for me?</p> <p>20 A. Yeah, sure. Some of them involved</p> <p>21 axle systems; some involved transmissions. I'd</p> <p>22 say the more -- the larger bulk involved</p> <p>23 transmission systems.</p> <p>24 Q. And that would be more in the context</p> <p>25 of crashes, sort of investigating?</p>	<p>1 S. Becker</p> <p>2 A. Well, something ends up crashing.</p> <p>3 Q. Okay.</p> <p>4 A. Somehow, somebody gets hurt.</p> <p>5 Q. Okay.</p> <p>6 A. And then the -- the component is</p> <p>7 drawn into question as to whether that</p> <p>8 contributed to the crash --</p> <p>9 Q. Okay.</p> <p>10 A. -- or the injury or whatever.</p> <p>11 Q. Right. And that's what percent --</p> <p>12 so, I'm sorry, of the -- of the time?</p> <p>13 A. Oh.</p> <p>14 Q. If I -- if I recall correctly, you</p> <p>15 said about 90 percent of your current work and</p> <p>16 that's been over the last -- since 2009 has</p> <p>17 been with respect to the forensic side --</p> <p>18 A. No, it --</p> <p>19 Q. -- crash?</p> <p>20 A. No, it would be 80 to 90 percent.</p> <p>21 Q. Okay. And of that 80 to 90 percent,</p> <p>22 what percentage of it has to do with sort of</p> <p>23 crash test analysis and investigations?</p> <p>24 MS. MANDRUSIAK: Objection, form.</p> <p>25 A. Yeah, I'm not certain exactly the</p>

<p style="text-align: right;">Page 10</p> <p>1 S. Becker</p> <p>2 percentage that would be related just to</p> <p>3 crashes.</p> <p>4 Q. Is it the majority?</p> <p>5 A. Correct.</p> <p>6 Q. Okay. And then you -- you indicated</p> <p>7 that you've also -- you know, about 10 to maybe</p> <p>8 20 percent of your work is with respect to</p> <p>9 engineering --</p> <p>10 A. Correct.</p> <p>11 Q. -- currently.</p> <p>12 And can you describe for me some of</p> <p>13 the engineering type matters that you're</p> <p>14 involved in --</p> <p>15 A. Sure.</p> <p>16 Q. -- with Fournier.</p> <p>17 A. One of my more recent projects was</p> <p>18 designing a product called The Truck Brush.</p> <p>19 Q. Uh-huh.</p> <p>20 A. And it's a hydraulically actuated</p> <p>21 brush that removes the snow off the roofs of</p> <p>22 tractor trailers as attached to a -- a</p> <p>23 hydraulic piece of equipment like a front</p> <p>24 loader or a fork truck or something of that</p> <p>25 nature.</p>	<p style="text-align: right;">Page 11</p> <p>1 S. Becker</p> <p>2 Q. Okay.</p> <p>3 A. Did the design work for the patent</p> <p>4 application, and the patent was filed and</p> <p>5 accepted. I'm not named on the patent; the</p> <p>6 owner of the idea is. And I provided all the</p> <p>7 design and engineering prototype procurement</p> <p>8 and testing.</p> <p>9 Q. Okay. So when you say design and</p> <p>10 engineering, you know, what are you referring</p> <p>11 to?</p> <p>12 A. Okay, yeah. That includes the</p> <p>13 calculations for the structural capability of</p> <p>14 the components.</p> <p>15 Q. Uh-huh.</p> <p>16 A. Durability evaluation estimation, and</p> <p>17 then the drawing of the, you know, the CAD</p> <p>18 models, the creation of the 3-D model, then the</p> <p>19 fit and function. So in other words, the</p> <p>20 general tolerancing and how the -- the</p> <p>21 product's going to interact with the other</p> <p>22 components in the product.</p> <p>23 Q. Okay. And then can you describe for</p> <p>24 me other -- other -- are there other products</p> <p>25 that you've been involved in designing?</p>
<p style="text-align: right;">Page 12</p> <p>1 S. Becker</p> <p>2 A. Sure. There's also a -- a cell phone</p> <p>3 product that's being developed for detecting</p> <p>4 crashes.</p> <p>5 Q. Uh-huh.</p> <p>6 A. So it was outlining the test program</p> <p>7 and how to validate and verify that the product</p> <p>8 can function correctly and appropriately, and</p> <p>9 then doing that testing at a facility crashing</p> <p>10 vehicles.</p> <p>11 Q. So is it sort of like a black box for</p> <p>12 cars or something along those lines?</p> <p>13 A. It's more insurance type of thing.</p> <p>14 Q. I see.</p> <p>15 How long -- for example, with the --</p> <p>16 with the cell phone product, how long did it</p> <p>17 take you to -- well, okay, let's back up.</p> <p>18 What -- what design work did you do</p> <p>19 for that product?</p> <p>20 A. Oh, that was the evaluation of the</p> <p>21 capabilities for the hardware involved --</p> <p>22 Q. Uh-huh.</p> <p>23 A. -- for the sensors, and then it was</p> <p>24 the test protocol and development, sort of</p> <p>25 the -- the DVP&amp;R plan: Design, verification,</p>	<p style="text-align: right;">Page 13</p> <p>1 S. Becker</p> <p>2 and product reliability planning.</p> <p>3 Q. Okay. So the design of the product</p> <p>4 itself sort of came to you?</p> <p>5 A. Correct.</p> <p>6 Q. And then you were verifying it?</p> <p>7 A. Correct.</p> <p>8 Q. Okay. And how long did that</p> <p>9 verification process take?</p> <p>10 A. I believe it's still going on.</p> <p>11 Q. So would that be months? Would it be</p> <p>12 six months --</p> <p>13 A. Yeah, my --</p> <p>14 Q. -- or more?</p> <p>15 A. -- component of it, my last set of</p> <p>16 components of it was about, oh, just under a</p> <p>17 year.</p> <p>18 Q. And that's again just the</p> <p>19 verification side of it --</p> <p>20 A. Exactly.</p> <p>21 Q. -- is that right?</p> <p>22 And do you have any idea how long the</p> <p>23 design side of it took, or you weren't involved</p> <p>24 in that?</p> <p>25 A. It's still going on. I couldn't --</p>

<p style="text-align: right;">Page 14</p> <p>1 S. Becker</p> <p>2 couldn't comment.</p> <p>3 Q. Okay. And with respect to the prior</p> <p>4 product you mentioned?</p> <p>5 A. Again, that was -- that product</p> <p>6 started in I think 2013.</p> <p>7 Q. Uh-huh.</p> <p>8 A. I think we got the patent last year.</p> <p>9 Q. Okay. And were you involved in the</p> <p>10 design of that product?</p> <p>11 A. Oh, certainly, yes.</p> <p>12 Q. Yes. So in what capacity were you</p> <p>13 involved in the design?</p> <p>14 A. That was the one that I just</p> <p>15 previously answered. I was doing the</p> <p>16 calculations, the stress analysis, the layout</p> <p>17 and construction, CAD modeling, and then the</p> <p>18 tolerancing.</p> <p>19 Q. Okay. So once again, would the</p> <p>20 structural sort of details have been provided</p> <p>21 to you in advance?</p> <p>22 A. No.</p> <p>23 Q. Okay. So for that, you -- you did</p> <p>24 come up with a --</p> <p>25 A. They had a -- sort of a general</p>	<p style="text-align: right;">Page 15</p> <p>1 S. Becker</p> <p>2 layout.</p> <p>3 Q. Uh-huh.</p> <p>4 A. They wanted to use this type of</p> <p>5 brush.</p> <p>6 Q. I see.</p> <p>7 A. And they wanted to cover a truck. So</p> <p>8 those were kind of the incoming specifications.</p> <p>9 And then they wanted to interact with these</p> <p>10 types of pieces of equipment, so that's the</p> <p>11 other end, so then I had to put in everything</p> <p>12 in between.</p> <p>13 Q. Okay. And how -- you get hired</p> <p>14 through Robson? Is that how this works --</p> <p>15 A. No, I'm --</p> <p>16 Q. -- basically?</p> <p>17 A. -- employed directly by Robson.</p> <p>18 Q. Okay.</p> <p>19 A. So they -- they call either an admin</p> <p>20 or call me or they call one of our business</p> <p>21 development people.</p> <p>22 Q. Okay.</p> <p>23 A. And the case work either is directed</p> <p>24 to me or I take in the inquiry and then send</p> <p>25 that to the admin and then we file the</p>
<p style="text-align: right;">Page 16</p> <p>1 S. Becker</p> <p>2 paperwork.</p> <p>3 Q. Okay, fine. So you're a 100 percent</p> <p>4 employee of Robson's --</p> <p>5 A. Salary.</p> <p>6 Q. -- right?</p> <p>7 A. Right.</p> <p>8 Q. Okay. Then they've got the sort of</p> <p>9 splits of your time between the forensic side</p> <p>10 of it and the sort of --</p> <p>11 A. Fournier side.</p> <p>12 Q. -- engineering side of it?</p> <p>13 A. Correct.</p> <p>14 THE REPORTER: I'm sorry, I'm going</p> <p>15 to just pause for a minute.</p> <p>16 MS. SHAH: All right.</p> <p>17 THE REPORTER: It's just the way</p> <p>18 you're asking your questions with a</p> <p>19 slight pause before those last few words</p> <p>20 of your question, but you're answering</p> <p>21 overtop of that. So wait until the</p> <p>22 whole entire question is out.</p> <p>23 MS. SHAH: Yeah, it's --</p> <p>24 THE REPORTER: And then it'll read</p> <p>25 better in the end. And that's our goal.</p>	<p style="text-align: right;">Page 17</p> <p>1 S. Becker</p> <p>2 So now your next question, ma'am?</p> <p>3 BY MS. SHAH:</p> <p>4 Q. Okay, so going back to the last</p> <p>5 question, you -- you -- you indicated that</p> <p>6 you're 100 percent employed by Robson; is that</p> <p>7 correct?</p> <p>8 A. Correct.</p> <p>9 Q. And they have kind of allocated your</p> <p>10 time between Forensics and the Fournier</p> <p>11 engineering component?</p> <p>12 A. Yeah. They don't specifically</p> <p>13 allocate it, but it's, you know, whatever comes</p> <p>14 in.</p> <p>15 Q. Okay. And for the last decade or so</p> <p>16 or the last -- is it a decade, roughly, that</p> <p>17 it's -- you've essentially had this effectively</p> <p>18 80/20 split of time?</p> <p>19 MS. MANDRUSIAK: Objection, form.</p> <p>20 A. Yeah, since 2009.</p> <p>21 MS. SHAH: Okay.</p> <p>22 (Becker Exhibit No. 1 was marked for</p> <p>23 identification.)</p> <p>24 MS. MANDRUSIAK: Do you have a copy</p> <p>25 for us?</p>

<p style="text-align: right;">Page 18</p> <p>1 S. Becker</p> <p>2 MS. SHAH: No, there's just the</p> <p>3 three. I can give you this copy.</p> <p>4 MS. MANDRUSIAK: Thank you.</p> <p>5 BY MS. SHAH:</p> <p>6 Q. So if you can identify for me what</p> <p>7 the first exhibit is here.</p> <p>8 A. It looks like something from our</p> <p>9 website.</p> <p>10 Q. Do you recognize this?</p> <p>11 A. Yes.</p> <p>12 Q. Did you help create this biography?</p> <p>13 A. A portion of it, yeah.</p> <p>14 Q. What portion of it did you help</p> <p>15 create?</p> <p>16 A. I wouldn't recall the exact portion.</p> <p>17 There's our marketing guy and there's my -- my</p> <p>18 boss. They both contributed.</p> <p>19 Q. Okay. But -- but you've reviewed</p> <p>20 this biography?</p> <p>21 A. Correct.</p> <p>22 Q. So can you turn to the -- let's see</p> <p>23 here. I guess let's start with the first page.</p> <p>24 It indicates here that you provide</p> <p>25 investigation reports and testimony toward the</p>	<p style="text-align: right;">Page 19</p> <p>1 S. Becker</p> <p>2 resolution of litigation involving vehicle</p> <p>3 crashes, fires, and other losses.</p> <p>4 Is that accurate?</p> <p>5 In the sort of second sentence of the</p> <p>6 first page, do you see that sentence?</p> <p>7 A. Yeah.</p> <p>8 Q. And is that sentence accurate?</p> <p>9 A. Correct.</p> <p>10 Q. And again, is that sort of roughly</p> <p>11 80 percent of work that you do for Robson</p> <p>12 Forensic?</p> <p>13 A. Correct, yeah. Investigations,</p> <p>14 reports, and testimony.</p> <p>15 Q. And then continuing on to the second</p> <p>16 page, it talks about the -- the first sentence</p> <p>17 of the second page talks about your work as an</p> <p>18 engineer associated with computer-aided design</p> <p>19 and crash modeling, physical testing.</p> <p>20 Just the second -- I'm sorry, it's</p> <p>21 the first sentence of the second page. Does</p> <p>22 that essentially capture the work that you do</p> <p>23 for Fournier Robson?</p> <p>24 MS. MANDRUSIAK: Objection, form.</p> <p>25 A. Well, it -- it says "was," so I think</p>
<p style="text-align: right;">Page 20</p> <p>1 S. Becker</p> <p>2 it's kind of referring to my -- my previous</p> <p>3 work.</p> <p>4 Q. Okay. Okay, so then let's -- so</p> <p>5 in -- in the context of your previous work,</p> <p>6 what experience do you have that then ties in</p> <p>7 with this -- this sentence, the first sentence</p> <p>8 of the second page?</p> <p>9 A. Sure. I provided computer-aided</p> <p>10 design, crash modeling, physical testing, data</p> <p>11 analysis for durability and performance.</p> <p>12 And I had a specialty in noise and</p> <p>13 vibration, and I did that at -- at Chrysler and</p> <p>14 at New Venture Gear, Chrysler, Magna</p> <p>15 Powertrain. There was kind of like a -- can I</p> <p>16 give you a little background?</p> <p>17 Q. Absolutely, please.</p> <p>18 A. New Venture Gear was a joint venture</p> <p>19 between Chrysler and General Motors to make</p> <p>20 transmissions, axles, four-wheel drive systems.</p> <p>21 And they diverted. Is that a word? They</p> <p>22 broke up and then I was a Chrysler employee for</p> <p>23 four years, working for Carlos Lobo. And then</p> <p>24 they sold us to Magna and then that became</p> <p>25 Magna Powertrain.</p>	<p style="text-align: right;">Page 21</p> <p>1 S. Becker</p> <p>2 Q. Okay.</p> <p>3 A. But it was all one place.</p> <p>4 Q. Got it.</p> <p>5 A. It's not like I moved around.</p> <p>6 Q. So you were in the same building but</p> <p>7 the letterhead kept changing?</p> <p>8 A. Exactly.</p> <p>9 Q. Okay. And while you were in that --</p> <p>10 sort of essentially the same job -- is that</p> <p>11 fair? It's the same job all the way through</p> <p>12 while the titles sort of -- the companies</p> <p>13 changed?</p> <p>14 A. During that segment of my career,</p> <p>15 yeah.</p> <p>16 Q. And the -- so can you describe for me</p> <p>17 the -- the nature of the work that you did at</p> <p>18 that point?</p> <p>19 Again, is it representative of this</p> <p>20 sentence here that says that you were involved</p> <p>21 in computer-aided design and crash modeling and</p> <p>22 physical testing and data analysis for</p> <p>23 durability and performance with a specialty in</p> <p>24 noise and vibration engineering?</p> <p>25 Is that sort of a summation of what</p>

<p style="text-align: right;">Page 22</p> <p>1 S. Becker</p> <p>2 you did --</p> <p>3 A. Correct.</p> <p>4 Q. -- during that period of time?</p> <p>5 A. Correct.</p> <p>6 Q. All right. So then the second</p> <p>7 sentence says in this role, you were</p> <p>8 responsible for designing vehicle systems,</p> <p>9 identifying, diagnosing, and remediating noise</p> <p>10 and vibration throughout entire vehicles.</p> <p>11 Is it accurate to say you were</p> <p>12 responsible for designing the vehicle systems</p> <p>13 as well as identifying, diagnosing, and</p> <p>14 remediating noise and vibration throughout the</p> <p>15 entire vehicles?</p> <p>16 Were you actually involved with the</p> <p>17 design of the vehicle systems or more on the</p> <p>18 kind of testing side of it?</p> <p>19 A. No, I was involved with the designing</p> <p>20 side.</p> <p>21 Q. Okay.</p> <p>22 A. I had responsibility for -- and</p> <p>23 again, it depended on what manager I had at the</p> <p>24 time as to how much I got involved. But</p> <p>25 basically what would happen is is the -- can I</p>	<p style="text-align: right;">Page 23</p> <p>1 S. Becker</p> <p>2 give you the overview --</p> <p>3 Q. Sure.</p> <p>4 A. -- instead of the --</p> <p>5 Q. Yeah.</p> <p>6 A. -- piecemeal?</p> <p>7 Q. Yeah, go ahead.</p> <p>8 A. The customer specifications would</p> <p>9 come in from the client, say, a Chrysler, a</p> <p>10 Ford, a Nissan or Land Rover, etc.</p> <p>11 I would be part of the review team</p> <p>12 for the specifications. We would hash out what</p> <p>13 we were going to do for an overall model of the</p> <p>14 product as a team. That would go back to the</p> <p>15 customer. They would either agree, disagree,</p> <p>16 you know, then the core design would come down.</p> <p>17 The parts responsible engineers are</p> <p>18 the people who had to sign off on the drawings.</p> <p>19 My role was on the review of the design and</p> <p>20 coming up with the new ideas or solutions to</p> <p>21 problems.</p> <p>22 Q. Uh-huh.</p> <p>23 A. So I had to critique the design</p> <p>24 initial concepts and send those off to my</p> <p>25 modeling guys that worked for me to do the</p>
<p style="text-align: right;">Page 24</p> <p>1 S. Becker</p> <p>2 refinement of the structure and the internal</p> <p>3 components --</p> <p>4 Q. Uh-huh.</p> <p>5 A. -- whether it's the specific geometry</p> <p>6 of the gearing or the toothing model for the</p> <p>7 chain drive system or the adapters for the</p> <p>8 drivelines, prop shafts, or axle shapes.</p> <p>9 Then they would create the</p> <p>10 tolerancing and perform the initial</p> <p>11 calculations, assign that to the prototype</p> <p>12 department, who would make the first</p> <p>13 components. They would send them up to me for</p> <p>14 review and validation and developing the test</p> <p>15 plan as to how we're going to say that the</p> <p>16 design works.</p> <p>17 Q. Uh-huh.</p> <p>18 A. We would work out what the test</p> <p>19 schedule was going to be for the dynamometers,</p> <p>20 the over-the-road vehicles, the prototypes in</p> <p>21 the evaluation of a product. If deficiencies</p> <p>22 are found there, then I would have to make the</p> <p>23 recommendations for the changes and send those</p> <p>24 up to the design guys to -- not the -- the</p> <p>25 parts guys to implement the changes on the</p>	<p style="text-align: right;">Page 25</p> <p>1 S. Becker</p> <p>2 component drawings, send that back, and -- and</p> <p>3 then it became an iterative process through</p> <p>4 finalization of the product.</p> <p>5 Q. Okay. And so this would sort of</p> <p>6 component by component essentially or kind of</p> <p>7 a --</p> <p>8 A. Yeah, depending on -- because -- by</p> <p>9 "component," you mean product by product.</p> <p>10 Q. Uh-huh.</p> <p>11 A. Yeah.</p> <p>12 Q. And then, for example, you started to</p> <p>13 mention that there would be, you know, sort of</p> <p>14 specific gears with, you know, gear toothing</p> <p>15 relationships that you'd be working on.</p> <p>16 Can you give me -- sort of in the</p> <p>17 context of the work that you did, can you give</p> <p>18 me some examples of the sorts of products that</p> <p>19 you worked on in this iterative fashion?</p> <p>20 A. Sure. A fun one was a -- a</p> <p>21 transmission for a drilling rig. We came up</p> <p>22 with a -- a large linear narrow structure of</p> <p>23 gears --</p> <p>24 Q. Uh-huh.</p> <p>25 A. -- that could transmit the gear ratio</p>

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<p>1 S. Becker</p> <p>2 and the torque multiplication needed to get the</p> <p>3 drill head to operate slowly while the drive</p> <p>4 system's operating fast but yet still fit in</p> <p>5 the design shaft.</p> <p>6 More commonly, it's involved with</p> <p>7 designing and developing either an axle gear or</p> <p>8 a planetary gearset for a transfer case or a</p> <p>9 transmission.</p> <p>10 There, you're working on sort of</p> <p>11 three components of a gear. You have the</p> <p>12 macrogeometry, in other words, the packaging</p> <p>13 envelope. Then you have the tooth</p> <p>14 macrogeometry, which is the overlap and how</p> <p>15 many teeth and the thickness of the tooth and</p> <p>16 where the root lies and things of that nature.</p> <p>17 Then you have the microgeometry where we would</p> <p>18 model the profile of the tooth in the</p> <p>19 micrometer type of dimensions.</p> <p>20 Q. Okay. So, for example, when you're</p> <p>21 talking about this -- sort of with respect to</p> <p>22 the axle gears and the work that you did there,</p> <p>23 would you -- there would be again this problem</p> <p>24 that would be identified to you, and -- and you</p> <p>25 and your group would come up with a gear design</p>	<p>1 S. Becker</p> <p>2 and then test it?</p> <p>3 A. There would be a ratio requirement --</p> <p>4 Q. Uh-huh.</p> <p>5 A. -- from the customer.</p> <p>6 Q. Okay.</p> <p>7 A. That would be the only sort of given</p> <p>8 input.</p> <p>9 Q. I see.</p> <p>10 A. And then we would design the gear.</p> <p>11 Q. To meet --</p> <p>12 A. Raw, yeah.</p> <p>13 Q. Okay.</p> <p>14 A. And that was what we called our gear</p> <p>15 center.</p> <p>16 Q. Uh-huh. Did you -- did you design</p> <p>17 any sort of products or components from</p> <p>18 scratch?</p> <p>19 A. Of course. They were -- they were</p> <p>20 more frequently from scratch.</p> <p>21 Q. And give me an example of -- of that</p> <p>22 kind of development work.</p> <p>23 A. Well, let's go back to my first</p> <p>24 electric vehicle. We did the -- the Chrysler</p> <p>25 electric minivan. I think we called it the</p>
Page 28	Page 29
<p>1 S. Becker</p> <p>2 N.V.T.(110). And we had a unique gearset.</p> <p>3 They wanted a -- I think the first box was a</p> <p>4 two-speed; the second box was a one-speed. And</p> <p>5 in the second box, the one-speed, we were</p> <p>6 designing the, you know, the core gears. There</p> <p>7 was an input shaft where the gear cut into the</p> <p>8 shaft, then there was an intermediate shaft</p> <p>9 where the gear pressed onto a shaft, and then</p> <p>10 there was the final drive output, which had the</p> <p>11 final drive gear in the differential housing.</p> <p>12 That was a transaxle box.</p> <p>13 Q. Okay. And so how big of a team were</p> <p>14 you involved -- how large was this team that</p> <p>15 was working on this project?</p> <p>16 A. Like on the (T)110 project?</p> <p>17 Q. I'm sorry, I'm not sure if I'm</p> <p>18 familiar with that number. Is that the -- is</p> <p>19 that the (T)110?</p> <p>20 A. That's the one I just mentioned, the</p> <p>21 electric vehicle.</p> <p>22 Q. Okay.</p> <p>23 A. That vehicle had another gear</p> <p>24 designer with me. There was the advance</p> <p>25 products manager. I think he had two guys with</p>	<p>1 S. Becker</p> <p>2 him for PRE work, parts responsible, the -- the</p> <p>3 working with the drafters type job. And -- and</p> <p>4 then there was all the people at Chrysler. I</p> <p>5 don't recall the size of their team.</p> <p>6 So that team was probably about six</p> <p>7 or seven people. And then, of course, you</p> <p>8 know, any mechanics and prototype people we</p> <p>9 needed.</p> <p>10 Q. Okay. So you -- you reference that</p> <p>11 had there was another gear design person with</p> <p>12 you. So you -- kind of you nominally fit into</p> <p>13 the gear design, sort of. I guess that's sort</p> <p>14 of how you -- that's the title that you give</p> <p>15 yourself?</p> <p>16 A. Well, on that product I was doing the</p> <p>17 gear design --</p> <p>18 Q. Okay.</p> <p>19 A. -- with another gear designer.</p> <p>20 Q. Yes.</p> <p>21 A. And then I was responsible -- then he</p> <p>22 would move on to another gear design product.</p> <p>23 He was just a gear -- not "just" a gear. He</p> <p>24 was a gear designer. I was the gear designer</p> <p>25 and developer, and then I had to do the</p>



<p style="text-align: right;">Page 30</p> <p>1 S. Becker</p> <p>2 validation plan.</p> <p>3 Q. Are there other such examples of kind</p> <p>4 of design work that you would have done?</p> <p>5 A. Yeah. That would be similar to the</p> <p>6 NV1500 rear-wheel drive transmission, the T350</p> <p>7 and T355 transaxles. There's a number of them.</p> <p>8 And then we could go into like the BMW x3</p> <p>9 transfer case.</p> <p>10 Q. Okay. So that's --</p> <p>11 A. That's a gear -- a gear-driven design</p> <p>12 system. And there, I'm doing the housing and</p> <p>13 the shafting as well.</p> <p>14 Q. I'm sorry, and that's for what -- for</p> <p>15 which item?</p> <p>16 A. The 3 Series X cars, the all-wheel</p> <p>17 drive BMWs.</p> <p>18 Q. And do you know if the work that you</p> <p>19 did ultimately made its way into a -- a vehicle</p> <p>20 that's on the road?</p> <p>21 A. Yeah. That's what I was talking</p> <p>22 about.</p> <p>23 Q. Okay. But I'm saying that the -- did</p> <p>24 the work that you -- your development work</p> <p>25 is -- actually currently exists on that -- on</p>	<p style="text-align: right;">Page 31</p> <p>1 S. Becker</p> <p>2 that vehicle, on the --</p> <p>3 A. We changed --</p> <p>4 Q. -- 3 Series?</p> <p>5 A. -- that car since then so I'm not</p> <p>6 certain if the same gears are left in it. You</p> <p>7 know, it's been ten years.</p> <p>8 Q. But as far as you know, the work</p> <p>9 that -- there was some --</p> <p>10 A. Oh, at the time, document --</p> <p>11 Q. -- design?</p> <p>12 A. I mean, I drove the cars and that.</p> <p>13 Q. Okay. And then going back to the</p> <p>14 (T)110, I think you mentioned that number --</p> <p>15 A. Yeah.</p> <p>16 Q. -- that project, where you were</p> <p>17 working on gear design and validation, did that</p> <p>18 work ultimately -- did those gears ultimately</p> <p>19 get into a vehicle?</p> <p>20 A. Definitely, yeah.</p> <p>21 Q. And which vehicle is that?</p> <p>22 A. The first one -- well, the (T)110 was</p> <p>23 a Chrysler minivan and we ended up moving that</p> <p>24 into a -- a modified design for the Tesla, the</p> <p>25 first Roadster. I don't know if that -- I</p>
<p style="text-align: right;">Page 32</p> <p>1 S. Becker</p> <p>2 don't think that one made it into production,</p> <p>3 though, that Roadster. That was just</p> <p>4 prototypes.</p> <p>5 Q. Okay. And so -- I know you -- you</p> <p>6 started to --</p> <p>7 A. Kind of like the --</p> <p>8 Q. I'm sorry, we're going to have to be</p> <p>9 a little bit -- it's going to be tough for her,</p> <p>10 so what --</p> <p>11 THE REPORTER: It's actually the</p> <p>12 record, the final record that I'm</p> <p>13 concerned with. It needs to be</p> <p>14 questions and answers --</p> <p>15 MS. MANDRUSIAK: Yeah, I -- I --</p> <p>16 THE REPORTER: -- and not</p> <p>17 interruptions because it will help you</p> <p>18 all in the end.</p> <p>19 MS. SHAH: Sure. So why -- why</p> <p>20 don't we --</p> <p>21 MS. MANDRUSIAK: Let him finish his</p> <p>22 answer I think would be appropriate.</p> <p>23 You kind of cut him off.</p> <p>24 MS. SHAH: Yeah, sure, no problem.</p> <p>25 BY MS. SHAH:</p>	<p style="text-align: right;">Page 33</p> <p>1 S. Becker</p> <p>2 Q. Go ahead.</p> <p>3 A. But like the T350 and T355, those</p> <p>4 were Dodge Neon, Dodge Stratus and all the</p> <p>5 production years associated with that product.</p> <p>6 PT Cruiser, Dodge Caliber.</p> <p>7 And then all my transfer case work</p> <p>8 translated into the Jeep, Jeep Grand Cherokee,</p> <p>9 all of the four-wheel drive trucks, the large</p> <p>10 Chevys, small Chevys, the Ford Super Duty, so</p> <p>11 the 250 and 350, all of the Dodges, the Dodge</p> <p>12 pickup trucks, the smalls and larges. They're</p> <p>13 commercial vehicles.</p> <p>14 Then we move over to Land Rover. The</p> <p>15 Range Rover product, my gears were in the</p> <p>16 transfer case for that.</p> <p>17 The -- I don't know if they took our</p> <p>18 gears in the Audis or not. We did a design for</p> <p>19 Audi. We make the Audi product but I think we</p> <p>20 make it in Europe and we had two prototypes. I</p> <p>21 don't remember what the outcome of that was.</p> <p>22 Definitely, the Nissan pickup truck.</p> <p>23 And then, of course, the products I designed</p> <p>24 while I was at Chrysler. That would be in the</p> <p>25 Dodge Viper, the Chrysler minivan, the Dodge</p>

<p style="text-align: right;">Page 34</p> <p>1 S. Becker</p> <p>2 Stratus, the Cirrus convertible. And those</p> <p>3 would be the products that came out on or</p> <p>4 around the time when I was employed there. You</p> <p>5 know that I didn't continue working at Chrysler</p> <p>6 on Chrysler products afterwards.</p> <p>7 Q. Okay. So is it fair to say that the</p> <p>8 design work that you did related essentially</p> <p>9 to, you know, designing gears, standalone or</p> <p>10 that went into transfer cases?</p> <p>11 Is that the majority of the design</p> <p>12 work that you did while you were, I guess,</p> <p>13 with -- kind of in the ten years that you</p> <p>14 worked for Chrysler and Magna and these various</p> <p>15 other companies?</p> <p>16 MS. MANDRUSIAK: Objection, form.</p> <p>17 A. No. That was while I was with New</p> <p>18 Venture Gear New Process Gear group.</p> <p>19 BY MS. SHAH:</p> <p>20 Q. Okay.</p> <p>21 A. Before that, I was with -- at</p> <p>22 Chrysler directly in Dearborn -- Dearborn</p> <p>23 Heights? -- in Auburn Hills, Michigan. And</p> <p>24 there, I was doing design work on vehicle</p> <p>25 non -- nondriveline-specific components.</p>	<p style="text-align: right;">Page 35</p> <p>1 S. Becker</p> <p>2 Q. Okay. So let's take it one -- one at</p> <p>3 a time.</p> <p>4 So you were describing to me the --</p> <p>5 sort of your work as a gear designer and doing</p> <p>6 essentially -- you know, designing gears and</p> <p>7 sometimes doing validation work associated with</p> <p>8 the -- those kinds of products. That was for</p> <p>9 which company?</p> <p>10 A. That was for New Process Gear,</p> <p>11 Chrysler Magna Powertrain.</p> <p>12 Q. Okay. And then you also said you'd</p> <p>13 worked directly for Chrysler prior to that.</p> <p>14 And that was from what period to what period?</p> <p>15 A. I worked for Modern Engineering at</p> <p>16 Chrysler so I was hired by the Chrysler guy,</p> <p>17 but they didn't hire people directly at that</p> <p>18 time so I was on site but I was paid through</p> <p>19 Modern.</p> <p>20 Q. Okay.</p> <p>21 A. There was -- what was that? If I had</p> <p>22 my CV in front of me, I could tell you the</p> <p>23 exact dates, but I believe it was '94 to '97,</p> <p>24 or something like that.</p> <p>25 And that was in the scientific test</p>
<p style="text-align: right;">Page 36</p> <p>1 S. Becker</p> <p>2 labs. And there, I was designing all variety</p> <p>3 of components, intake systems, engine mounts,</p> <p>4 some structural components like bumpers and B</p> <p>5 pillars, half shafts, validating transmission</p> <p>6 designs from both New Process Gear as well as</p> <p>7 competitors and Chrysler's internal automatic</p> <p>8 transmission group, steering columns,</p> <p>9 instrument panels, and some of the overall body</p> <p>10 in white structure.</p> <p>11 Q. Okay. So when you say "designing,"</p> <p>12 what -- what does that -- I guess what does</p> <p>13 that mean to you when you say you're designing</p> <p>14 something? What --</p> <p>15 A. Sure.</p> <p>16 Q. What kind of process were you</p> <p>17 engaging in?</p> <p>18 A. Yeah. Whenever we had functional</p> <p>19 requirements, in other words, it had to fit</p> <p>20 within this vehicle and be about this size.</p> <p>21 And our design work was to mock up and create</p> <p>22 new concepts.</p> <p>23 In other words, let's take the -- the</p> <p>24 redesign of the Dodge Neon. The previous</p> <p>25 design had a four-mount system with two engine</p>	<p style="text-align: right;">Page 37</p> <p>1 S. Becker</p> <p>2 mounts on the sides and two lower mounts, one</p> <p>3 in the front and a bobble mount in the rear. I</p> <p>4 was tasked with redesigning and redeveloping</p> <p>5 that so we changed it to a double dogbone</p> <p>6 design on the one side and a hydrobushing on</p> <p>7 the other side. Coming up with a packaging,</p> <p>8 the rate requirements, cutting steel and making</p> <p>9 prototypes in our lab to evaluate the concept,</p> <p>10 then sending those to the part responsible</p> <p>11 engineer to make a productionizable design and</p> <p>12 then working with the suppliers to validate the</p> <p>13 designs meeting my requirements.</p> <p>14 MS. MANDRUSIAK: Okay.</p> <p>15 (Discussion held off the record.)</p> <p>16 BY MS. SHAH:</p> <p>17 Q. I think where we left off was you</p> <p>18 were kind of explaining to me the nature of the</p> <p>19 design work that you've done over the last --</p> <p>20 you know, the decade or so that you were</p> <p>21 directly employed by automotive supplier</p> <p>22 companies.</p> <p>23 Have you worked on -- would you say</p> <p>24 that you've designed driveline systems?</p> <p>25 A. Yes.</p>

<p style="text-align: right;">Page 38</p> <p>1 S. Becker</p> <p>2 Q. And how would you describe your work</p> <p>3 with respect to driveline systems?</p> <p>4 A. It depends on the driveline. But,</p> <p>5 for example, like on the Dodge Viper, when I</p> <p>6 was at Chrysler, there was a redesign of the</p> <p>7 driveline system. The driveline had a bending</p> <p>8 problem and we had to redesign and develop a</p> <p>9 solution for that issue.</p> <p>10 When it's at New Process Gear, New</p> <p>11 Venture Gear it's coming up with the core</p> <p>12 product as a team, you know, basically from</p> <p>13 concept to production.</p> <p>14 Q. Okay. Are you complete with your</p> <p>15 answer?</p> <p>16 Would that be in the context of where</p> <p>17 there's a problem that's been identified? Is</p> <p>18 that --</p> <p>19 A. No, that would be --</p> <p>20 Q. -- accurate or --</p> <p>21 A. -- for -- that would be for -- that</p> <p>22 would be for new products.</p> <p>23 Q. Okay. And so for new products,</p> <p>24 you've -- you have designed a driveline system?</p> <p>25 A. Correct.</p>	<p style="text-align: right;">Page 39</p> <p>1 S. Becker</p> <p>2 Q. Ground up?</p> <p>3 A. Correct.</p> <p>4 Q. And that was for which company?</p> <p>5 A. New Process, New Venture Gear, Magna</p> <p>6 Powertrain.</p> <p>7 Q. And can you describe the nature of</p> <p>8 the design work that you did, that -- that you</p> <p>9 were specifically involved in for that</p> <p>10 driveline system?</p> <p>11 A. Sure. Again, that would be taking</p> <p>12 the customer specification in as to what they</p> <p>13 wanted the vehicle to do, or it was working</p> <p>14 with our advance group to pitch a new type of</p> <p>15 product to a customer.</p> <p>16 Then they accept that product and we</p> <p>17 start making the product through the</p> <p>18 engineering development phase.</p> <p>19 So on the new concepts, for example,</p> <p>20 let's start with like the -- the Jeep Grand</p> <p>21 Cherokee four-wheel drive system. We pitched</p> <p>22 to Jeep that we could implement an electrically</p> <p>23 actuated clutch torque distribution system that</p> <p>24 would offer them a selectability for driver</p> <p>25 conditions, snow, rain, water, you know, dry,</p>
<p style="text-align: right;">Page 40</p> <p>1 S. Becker</p> <p>2 off-road. And on the team, we developed the</p> <p>3 specification.</p> <p>4 We created concept prototypes and</p> <p>5 then implemented them on -- by cutting up an</p> <p>6 old Jeep. And Chrysler liked the idea and went</p> <p>7 forward with an engineering program so then we</p> <p>8 took the program and created the NV245 product.</p> <p>9 Q. Okay. And how many people were part</p> <p>10 of that team?</p> <p>11 A. Overall team, like the initial stages</p> <p>12 when you're doing the concept, there's probably</p> <p>13 four of us. Then when you get into the</p> <p>14 productionable end of it, once the customer's</p> <p>15 accepted the product -- I'm sorry, when I say</p> <p>16 "four of us," I mean four engineers and</p> <p>17 managers.</p> <p>18 There's, of course, drafters and</p> <p>19 mechanics and things of that nature, support</p> <p>20 staff and prototype people. I don't want to</p> <p>21 discredit their work.</p> <p>22 Q. Okay.</p> <p>23 A. So then when you move into</p> <p>24 production, again, the engineering team would</p> <p>25 probably be about -- about seven people at our</p>	<p style="text-align: right;">Page 41</p> <p>1 S. Becker</p> <p>2 site, and then there would be two dedicated, at</p> <p>3 least two dedicated people at the Chrysler site</p> <p>4 on a product like that.</p> <p>5 Q. And so of the -- of these, you know,</p> <p>6 sort of multiperson teams that you were</p> <p>7 involved in, what would your role be?</p> <p>8 A. Again, I'm reviewing the core design</p> <p>9 of the product and the overall geometry looking</p> <p>10 at the structural components, the gears, the</p> <p>11 trans -- the chain and sprockets and the</p> <p>12 driveline adaptation and driveline imbalance</p> <p>13 and then NVH and durability.</p> <p>14 Q. Okay.</p> <p>15 A. I'm a lot less of the fit/finish,</p> <p>16 more of the function.</p> <p>17 Q. Okay. So with respect to your</p> <p>18 retention as an expert in this case for -- on</p> <p>19 behalf of JTEKT, when were you first contacted</p> <p>20 about becoming an expert?</p> <p>21 A. It was 2015, but I don't recall the</p> <p>22 month.</p> <p>23 Q. Would it have been in the fall or in</p> <p>24 the summer?</p> <p>25 A. I would have to have a retainer</p>

<p style="text-align: right;">Page 42</p> <p>1 S. Becker</p> <p>2 agreement in front of me to -- to tell you.</p> <p>3 Q. Okay. And who were you contacted by?</p> <p>4 A. Steve Kahn.</p> <p>5 Q. Is that someone at Oblon?</p> <p>6 A. No, he's a -- I think he's like a</p> <p>7 third-party finds-experts type of person.</p> <p>8 Q. All right. Is that someone who has</p> <p>9 contacted you in the past for expert work?</p> <p>10 A. No. He was a new client.</p> <p>11 Q. Okay. And what did you understand</p> <p>12 the nature of your retention to be?</p> <p>13 A. That there was a patent contention.</p> <p>14 They wanted a review of a couple of designs</p> <p>15 related to all-wheel drive systems.</p> <p>16 Q. Okay. And how many -- roughly, how</p> <p>17 many hours have you spent as -- sort of in that</p> <p>18 capacity?</p> <p>19 MS. MANDRUSIAK: Objection,</p> <p>20 relevance.</p> <p>21 A. I would have to have my billing in</p> <p>22 front of me for like an exact number. I know</p> <p>23 it's probably less than 40. Maybe around 40</p> <p>24 hours.</p> <p>25 Q. Okay. There was -- is there a</p>	<p style="text-align: right;">Page 43</p> <p>1 S. Becker</p> <p>2 declaration that you've put together for</p> <p>3 purposes of -- for -- for filing on behalf of</p> <p>4 JTEKT?</p> <p>5 A. Correct.</p> <p>6 Q. And did you author that declaration?</p> <p>7 A. Yes.</p> <p>8 Q. Did you author it independently?</p> <p>9 A. I discussed it with peer reviewers</p> <p>10 and with Oblon.</p> <p>11 Q. And by "peer reviewers," who do you</p> <p>12 mean?</p> <p>13 A. Persons in my company who are</p> <p>14 mechanical engineers.</p> <p>15 Q. Okay.</p> <p>16 A. One is Tom Lacek; another is Marcus</p> <p>17 Mazza. We have a peer review process where we</p> <p>18 review all the documents we send out.</p> <p>19 Q. So you would have sent the -- I guess</p> <p>20 a draft declaration to them to review?</p> <p>21 A. Yeah. We had ongoing discussions.</p> <p>22 Q. And what were the nature of those</p> <p>23 discussions?</p> <p>24 MS. MANDRUSIAK: Objection, form.</p> <p>25 To the -- to the extent it may involve</p>
<p style="text-align: right;">Page 44</p> <p>1 S. Becker</p> <p>2 any privileged information that Oblon</p> <p>3 shared with you, just caution you.</p> <p>4 THE WITNESS: Sure.</p> <p>5 A. The discussions would have been about</p> <p>6 the work, you know, from what did I want to put</p> <p>7 down, how do I want to lay it out, that type of</p> <p>8 thing.</p> <p>9 BY MS. SHAH:</p> <p>10 Q. Did you exchange drafts with them</p> <p>11 of -- of declarations?</p> <p>12 A. I only ended up with one copy on my</p> <p>13 computer but there were drafts prior to that,</p> <p>14 you know, written and then changed.</p> <p>15 Q. But with, I'm sorry, the two</p> <p>16 individuals, the two --</p> <p>17 A. Oh, likely --</p> <p>18 Q. -- sort of peer reviewers.</p> <p>19 A. Likely, yeah.</p> <p>20 Q. And do you recall what the nature of</p> <p>21 the changes were that were made? Were --</p> <p>22 A. No.</p> <p>23 Q. What kind of input did you get from</p> <p>24 your peer reviewers?</p> <p>25 A. We discussed the various patents, you</p>	<p style="text-align: right;">Page 45</p> <p>1 S. Becker</p> <p>2 know, the merits of each, what each section</p> <p>3 meant, and then how to address that. You know,</p> <p>4 it's overall peer review, language of the</p> <p>5 report and --</p> <p>6 Q. Okay. Are any of -- were any of the</p> <p>7 peer reviewers attorneys?</p> <p>8 A. No.</p> <p>9 Q. And what -- what's their background,</p> <p>10 the -- the background of these -- there's two,</p> <p>11 right, people that you mentioned as peer</p> <p>12 reviewers?</p> <p>13 A. Correct.</p> <p>14 Q. What are their backgrounds?</p> <p>15 A. Mark Ismasa is a mechanical engineer</p> <p>16 that used to work at Aberdeen and Chrysler</p> <p>17 doing vehicle engineering work.</p> <p>18 Tom Lacek's a mechanical engineer,</p> <p>19 PE. He used to do -- gosh, I don't know what</p> <p>20 he used to do exactly. He's been with Robson</p> <p>21 for a long time.</p> <p>22 Q. Do you have any patents that you've</p> <p>23 filed?</p> <p>24 A. No.</p> <p>25 Q. Do you know if they have any patents</p>

<p style="text-align: right;">Page 46</p> <p>1 S. Becker</p> <p>2 that they filed?</p> <p>3 A. I'm not aware of any.</p> <p>4 Q. Do you know if any of the, I guess,</p> <p>5 the subject matter that's in the declaration</p> <p>6 that was filed is content that came from the</p> <p>7 peer reviewers?</p> <p>8 A. I don't know what you mean by that.</p> <p>9 Q. So in the -- you -- you had</p> <p>10 discussions with your sort of peers --</p> <p>11 A. Correct.</p> <p>12 Q. -- about the -- the subject matter of</p> <p>13 the declarations --</p> <p>14 A. Yes.</p> <p>15 Q. -- is that correct?</p> <p>16 And there was presumably some sort of</p> <p>17 give-and-take, some -- some ideas and</p> <p>18 information that came from the other peer</p> <p>19 reviewers related to this -- to this</p> <p>20 declaration; is that correct?</p> <p>21 A. Generally, yes.</p> <p>22 Q. Would any of that have made it into</p> <p>23 the final declaration, any of their input?</p> <p>24 A. Actually --</p> <p>25 MS. MANDRUSIAK: Objection to form.</p>	<p style="text-align: right;">Page 47</p> <p>1 S. Becker</p> <p>2 A. -- one of the funny things I was just</p> <p>3 commenting on when I was talking with Marcus</p> <p>4 the other day, I think I shot down most of</p> <p>5 everything that he had, so --</p> <p>6 BY MS. SHAH:</p> <p>7 Q. Okay.</p> <p>8 A. -- it didn't make it into the</p> <p>9 declaration, as I recall.</p> <p>10 Q. So what were the -- do you recall</p> <p>11 what were the kinds of, I guess, comments that</p> <p>12 he had about the declaration that you then shot</p> <p>13 down?</p> <p>14 A. Well, the other day we were</p> <p>15 discussing, whatchamacallit, hub disconnects,</p> <p>16 and we never put that in the declaration.</p> <p>17 Q. Okay. Anything else that you</p> <p>18 remember about those discussions?</p> <p>19 A. No, that --</p> <p>20 MS. MANDRUSIAK: Objection, form.</p> <p>21 A. That was the main thing that I</p> <p>22 recall.</p> <p>23 BY MS. SHAH:</p> <p>24 Q. Okay. Do you know about how many</p> <p>25 drafts that you created for the declaration?</p>
<p style="text-align: right;">Page 48</p> <p>1 S. Becker</p> <p>2 MS. MANDRUSIAK: Objection,</p> <p>3 relevance.</p> <p>4 A. No.</p> <p>5 BY MS. SHAH:</p> <p>6 Q. Were there several?</p> <p>7 MS. MANDRUSIAK: Objection,</p> <p>8 relevance.</p> <p>9 A. All's I have is the one copy left, so</p> <p>10 it was always an overwrite.</p> <p>11 BY MS. SHAH:</p> <p>12 Q. So for purposes of the declaration,</p> <p>13 the references that you looked at, where did</p> <p>14 you receive those references from?</p> <p>15 A. The patents?</p> <p>16 Q. Yes.</p> <p>17 A. From Oblon.</p> <p>18 Q. Did you -- was there -- did you --</p> <p>19 were you involved in any prior art searching?</p> <p>20 A. Yes.</p> <p>21 Q. Can you describe for me that process?</p> <p>22 A. Sure. I looked at the patents we had</p> <p>23 from New Venture Gear, Porter and Sharma and</p> <p>24 some other things that I looked up.</p> <p>25 Q. Okay. You looked at them in what</p>	<p style="text-align: right;">Page 49</p> <p>1 S. Becker</p> <p>2 context? For what purpose?</p> <p>3 A. For review and compare to what I was</p> <p>4 going to create for the declaration.</p> <p>5 Q. Okay. The references that were</p> <p>6 relied on in the declaration, for example, the</p> <p>7 Teraoka reference or the Watanabe reference,</p> <p>8 were those references that you searched for and</p> <p>9 obtained?</p> <p>10 A. No. Those were provided by Oblon.</p> <p>11 Q. So when you were first retained, were</p> <p>12 you given a set of references?</p> <p>13 A. I don't recall the timing.</p> <p>14 Q. But you did not obtain any references</p> <p>15 for purposes of the declaration; right?</p> <p>16 MS. MANDRUSIAK: Objection, asked</p> <p>17 and answered.</p> <p>18 A. Well, no. As -- as I mentioned, I</p> <p>19 reviewed other ones that I looked up.</p> <p>20 Q. Okay.</p> <p>21 A. For the ones that made it into the</p> <p>22 final declaration was Teraoka, Watanabe, and</p> <p>23 Burrows, which were provided.</p> <p>24 Q. Okay. Have you read the petition</p> <p>25 that was filed in this case?</p>

<p style="text-align: right;">Page 50</p> <p>1 S. Becker</p> <p>2 A. I'm not certain exactly to what</p> <p>3 you're referring.</p> <p>4 Q. Okay. Well, what -- can you tell me,</p> <p>5 what materials did you read in preparing for</p> <p>6 your deposition today?</p> <p>7 A. Specifically in prep for the dep</p> <p>8 today was the declaration, your response, the</p> <p>9 various patent -- the -- the three patent --</p> <p>10 four patents, your '440 patent, the Teraoka,</p> <p>11 Burrows, Watanabe, and -- oh, and the judge's</p> <p>12 response.</p> <p>13 Q. Okay. Was there anything else that</p> <p>14 you reviewed in preparation for today's</p> <p>15 deposition?</p> <p>16 A. A little bit of the patent</p> <p>17 prosecution history.</p> <p>18 Q. Okay. Going back to the -- you</p> <p>19 mentioned you looked at some other patents that</p> <p>20 didn't -- that didn't make it into the</p> <p>21 declaration.</p> <p>22 Is there anything that you looked at</p> <p>23 other than -- I guess let me strike that.</p> <p>24 Is there -- were there any references</p> <p>25 that you independently looked at that did make</p>	<p style="text-align: right;">Page 51</p> <p>1 S. Becker</p> <p>2 it into the declaration?</p> <p>3 A. Not that I recall.</p> <p>4 Q. Okay. What's your understanding</p> <p>5 of -- of obviousness?</p> <p>6 A. Obviousness?</p> <p>7 Q. Yes.</p> <p>8 A. In relation to this case, obviousness</p> <p>9 was related to what a person of ordinary skill</p> <p>10 in the art who's in the industry is familiar</p> <p>11 with.</p> <p>12 Q. And what do you mean by "familiar</p> <p>13 with"?</p> <p>14 A. In other words, someone in my</p> <p>15 industry would be familiar that a clutch causes</p> <p>16 drag. Anybody who's in my industry should be</p> <p>17 familiar with that concept.</p> <p>18 Q. And what's your understanding of a</p> <p>19 person of ordinary skill in the art? What does</p> <p>20 that term mean to you?</p> <p>21 A. It means somebody in my industry</p> <p>22 who's familiar with the components and the</p> <p>23 design process for making automotive parts</p> <p>24 related to driveline systems.</p> <p>25 I could assign, you know, either one</p>
<p style="text-align: right;">Page 52</p> <p>1 S. Becker</p> <p>2 of my engineers, or one of my managers could be</p> <p>3 a person of ordinary skill from my previous</p> <p>4 work.</p> <p>5 Q. Is there a certain amount of</p> <p>6 background or experience that's required to</p> <p>7 satisfy that term, "person of ordinary skill in</p> <p>8 the art," with reference to this particular --</p> <p>9 let's say the '440 patent?</p> <p>10 MS. MANDRUSIAK: Objection, form.</p> <p>11 A. I don't think a specific date defines</p> <p>12 that skill level. I've had guys who come out</p> <p>13 of college who had already designed vehicles</p> <p>14 and, you know, knew what they were doing,</p> <p>15 worked on SAE cars and things of that nature.</p> <p>16 I've had people work for me who had</p> <p>17 Ph.Ds that really did not know vehicle</p> <p>18 components so I can't define it by an</p> <p>19 experience level at that point.</p> <p>20 Once you're familiar with the</p> <p>21 components and you're familiar with the</p> <p>22 industry, then you'd be a person of ordinary</p> <p>23 skill in art.</p> <p>24 Q. And what does it take to become</p> <p>25 familiar with the components and familiar with</p>	<p style="text-align: right;">Page 53</p> <p>1 S. Becker</p> <p>2 the industry?</p> <p>3 A. It's sort of an ipse dixit. Being</p> <p>4 familiar with the components and the industry.</p> <p>5 Q. Okay. So there's no -- is there a</p> <p>6 specific educational level that's required?</p> <p>7 MS. MANDRUSIAK: Objection, form.</p> <p>8 A. No, you could overcome that with</p> <p>9 experience. I've had associate's degreed</p> <p>10 people who were engineers, and I've had</p> <p>11 engineers and then Ph.D. people who weren't</p> <p>12 engineering qualified. So again, it's -- it's</p> <p>13 familiarity with the components and with how to</p> <p>14 design products -- products.</p> <p>15 BY MS. SHAH:</p> <p>16 Q. So for driveline systems in</p> <p>17 particular, is there a specific familiarity, as</p> <p>18 you say, that's required?</p> <p>19 MS. MANDRUSIAK: Objection, form.</p> <p>20 A. I don't know how to define that</p> <p>21 specifically. Again, I -- if it was a person I</p> <p>22 wasn't comfortable giving a task to working</p> <p>23 independently, I would say that they're not</p> <p>24 familiar with the art.</p> <p>25 BY MS. SHAH:</p>

<p style="text-align: right;">Page 54</p> <p>1 S. Becker</p> <p>2 Q. So is it accurate to say then that</p> <p>3 there's no specific educational requirement</p> <p>4 necessarily or years of driveline experience to</p> <p>5 satisfy the requirement of a person of ordinary</p> <p>6 skill in the art?</p> <p>7 MS. MANDRUSIAK: Objection, form.</p> <p>8 A. No, I'm saying I can't define that</p> <p>9 specifically. I can't put a number to it</p> <p>10 because it depends on the individual.</p> <p>11 But generally, you know, kind of the</p> <p>12 generality, people have a bachelor's degree in</p> <p>13 engineering and are familiar with the</p> <p>14 components. There are people who have</p> <p>15 associate's degrees who are familiar in the</p> <p>16 art. There are people who have Ph.Ds who are</p> <p>17 familiar with the art, etc.</p> <p>18 Q. Okay. So then is it accurate to say</p> <p>19 there is no specific minimal amount of either</p> <p>20 educational background or experience that's</p> <p>21 required to, in your mind, to be a designer of</p> <p>22 a driveline system?</p> <p>23 MS. MANDRUSIAK: Objection, form.</p> <p>24 A. Again, I'm saying I can't define</p> <p>25 that. I would evaluate candidates</p>	<p style="text-align: right;">Page 55</p> <p>1 S. Becker</p> <p>2 independently.</p> <p>3 BY MS. SHAH:</p> <p>4 Q. Okay. So taking it out of the</p> <p>5 context of, I guess, designers you would have</p> <p>6 worked with, looking at it in the context of</p> <p>7 the '440 patent, are there any qualifications</p> <p>8 that are required to meet the definition of a</p> <p>9 person of ordinary skill in the art?</p> <p>10 MS. MANDRUSIAK: Objection, form.</p> <p>11 A. I would recommend that they have</p> <p>12 experience in designing draft line systems or</p> <p>13 developing vehicle products. As a general rule</p> <p>14 of thumb, again, a bachelor's degree in</p> <p>15 engineering would be helpful. That gives you</p> <p>16 the background processes of developing and</p> <p>17 creating a product.</p> <p>18 BY MS. SHAH:</p> <p>19 Q. So it's sufficient that they would</p> <p>20 have had experience developing any vehicle</p> <p>21 product, that that experience would be</p> <p>22 sufficient to satisfy the standard for a person</p> <p>23 of ordinary skill in the art?</p> <p>24 A. Any vehicle with a driveline product,</p> <p>25 yeah. Obviously, the guy who designs the lug</p>
<p style="text-align: right;">Page 56</p> <p>1 S. Becker</p> <p>2 nut and just the lug nut wouldn't have</p> <p>3 potentially knowledge in driveline systems.</p> <p>4 Q. What kind of knowledge do you think</p> <p>5 is sort of a prerequisite to be able to design</p> <p>6 a driveline system?</p> <p>7 A. Sure. If we're talking about</p> <p>8 creating them from scratch, then it's a</p> <p>9 familiarity with the components that go into a</p> <p>10 driveline, driveline features, their fit and</p> <p>11 function, some of their failings and problems,</p> <p>12 different types of configurations and</p> <p>13 applications to driveline systems.</p> <p>14 Drivelines aren't just used in cars;</p> <p>15 they're used in other types of vehicles and in</p> <p>16 machines and quite a variety of components.</p> <p>17 Q. Okay. So let's sort of take this</p> <p>18 individually. You mentioned that a designer of</p> <p>19 a driveline system should have familiarity with</p> <p>20 driveline features.</p> <p>21 Can you identify for me the -- sort</p> <p>22 of the list of features that you're</p> <p>23 referencing?</p> <p>24 A. Sure. It depends on the driveline</p> <p>25 you're creating. There's drivelines on, like,</p>	<p style="text-align: right;">Page 57</p> <p>1 S. Becker</p> <p>2 say, a test machine. There, the test machine's</p> <p>3 going to need to engage a component and have a</p> <p>4 driveline system.</p> <p>5 I'll take my design guys from AT&amp;T</p> <p>6 test. They made some of my test machines.</p> <p>7 They had to be familiar with making a</p> <p>8 low-vibration driveline that had driveline</p> <p>9 connections, gear boxes that made minimal</p> <p>10 influence on the test product.</p> <p>11 Another example is my dune buggy</p> <p>12 work. There, you've got to be familiar with</p> <p>13 the driveline system's life and strength, the</p> <p>14 adaptation to transmission and to delivering</p> <p>15 the powers to the wheels, so sizing of the</p> <p>16 axle, laying out of the components.</p> <p>17 Then you've got more advanced</p> <p>18 features that may be related to a driveline.</p> <p>19 Depending on the driveline, you have your</p> <p>20 driveline control systems, so we have</p> <p>21 electrical engineers that work on driveline</p> <p>22 systems. They develop the actuators, motors,</p> <p>23 control schema, software available for the --</p> <p>24 the application control.</p> <p>25 Then you have the various components</p>

<p style="text-align: right;">Page 58</p> <p>1 S. Becker</p> <p>2 of the driveline. You've got your</p> <p>3 transmissions, your clutches, dual clutches,</p> <p>4 synchronizers, dog clutches, clutch packs,</p> <p>5 chain drives, belt drives, geared systems both</p> <p>6 planetary, spur, helical, bevel, hypoid. All</p> <p>7 these play various factors.</p> <p>8 Then you get into packaging of each</p> <p>9 one of those components as well depending on</p> <p>10 where you are in the driveline development</p> <p>11 system.</p> <p>12 Q. Okay. So if you were a driveline</p> <p>13 designer, as you were discussing before, that</p> <p>14 you needed certain familiarity with these</p> <p>15 features, what's the extent of the</p> <p>16 understanding that you would need to have with</p> <p>17 respect to, let's say, the control side of it?</p> <p>18 A. Sure. On the control side, they'd</p> <p>19 have to have a background in electronics,</p> <p>20 capability for simulation because a lot of the</p> <p>21 control sides were on simulation as far as</p> <p>22 conventional vehicle development goes.</p> <p>23 Verification and validation, because</p> <p>24 a lot of the function of the control schema</p> <p>25 doesn't fit only within the simulation</p>	<p style="text-align: right;">Page 59</p> <p>1 S. Becker</p> <p>2 parameters. These things need to be validated</p> <p>3 and verified and generally are tweaked by</p> <p>4 vehicle development and vehicle synthesis</p> <p>5 groups.</p> <p>6 When you get up to the OEM level on</p> <p>7 any individual car or truck, you're probably</p> <p>8 talking I'd say about 150 people that work on</p> <p>9 the driveline system just for any, you know,</p> <p>10 one model of vehicle.</p> <p>11 Q. And so in your experience, how long</p> <p>12 does that sort of -- if there's a ground-up</p> <p>13 design that's being worked on for a driveline</p> <p>14 system, how long would that take?</p> <p>15 A. The whole process?</p> <p>16 Q. Yes.</p> <p>17 A. To what point?</p> <p>18 Q. I guess to where it's ready to go</p> <p>19 into a vehicle, completing testing and</p> <p>20 validation.</p> <p>21 A. Sure. Our current design cycles are</p> <p>22 usually in the two-year range.</p> <p>23 Q. Okay. And that again would entail</p> <p>24 this group of 100-plus people that you were</p> <p>25 referring to?</p>
<p style="text-align: right;">Page 60</p> <p>1 S. Becker</p> <p>2 A. Yeah, that's just on the OEM side.</p> <p>3 That's not talking about suppliers.</p> <p>4 Q. And how many -- and again, that --</p> <p>5 that includes -- can you list for me sort of</p> <p>6 all the different departments that are involved</p> <p>7 in kind of working together to ultimately</p> <p>8 design the driveline system from sort of, you</p> <p>9 know, from -- absolutely from scratch all the</p> <p>10 way through validation?</p> <p>11 A. So you start out with your -- your</p> <p>12 advanced concepts people. They're going to</p> <p>13 have the interaction with the marketing group,</p> <p>14 sadly enough. So you develop what features</p> <p>15 they want capable for the vehicle.</p> <p>16 Then you're going to have the</p> <p>17 driveline systems group broken down into</p> <p>18 transmission, driveshaft. And if it's an</p> <p>19 all-wheel drive system, then you're going to</p> <p>20 have your PTU group, your rear axle or RDM</p> <p>21 module, or rear differential module group. And</p> <p>22 sometimes the prop shaft people will also do</p> <p>23 the half shafts for the RDM; other times, it's</p> <p>24 going to be a whole separate axle group. Your</p> <p>25 going to have your wheel hub guys. They're</p>	<p style="text-align: right;">Page 61</p> <p>1 S. Becker</p> <p>2 going to do the -- the knuckle joint hubs and</p> <p>3 attachment to the wheels.</p> <p>4 And that defines your -- your full</p> <p>5 driveline system, which is basically everything</p> <p>6 downstream of the engine. That's going to</p> <p>7 start the design process.</p> <p>8 They're going to interact with</p> <p>9 suppliers as well as the internal manufacturing</p> <p>10 people for packaging envelope and shape and</p> <p>11 size, which means that they need to put lump</p> <p>12 sums together with the modeling group. They're</p> <p>13 going to create a 3-D model using these lump</p> <p>14 systems of the various components to define a</p> <p>15 packaging envelope for each one of the segments</p> <p>16 of the driveline.</p> <p>17 That's then going to develop into</p> <p>18 concept drawings so you'll have the -- the CAD</p> <p>19 groups, and they're going to pass their initial</p> <p>20 CAD models off to the FEA or finite element and</p> <p>21 simulation group.</p> <p>22 That's then going to trigger starting</p> <p>23 to work with the electronics guys for the</p> <p>24 controls and how to actuate the various systems</p> <p>25 and what size actuation systems they're going</p>



<p style="text-align: right;">Page 62</p> <p>1 S. Becker</p> <p>2 to use.</p> <p>3 Predominantly now, products are using</p> <p>4 electronic control or electronic motor</p> <p>5 actuation or solenoid actuation. In the past,</p> <p>6 they used to be various vacuum systems that</p> <p>7 would draw on engine core accessories. So now</p> <p>8 that we're out of accessories, we don't have to</p> <p>9 work as often with the engine group, but the</p> <p>10 transmission group still is required to</p> <p>11 interact with the engine group for the mating</p> <p>12 of the transmission to the engine.</p> <p>13 Then you're going to have your --</p> <p>14 your CAFE and fuel economy group with their</p> <p>15 input as far as weights and efficiencies. So</p> <p>16 whether we get a -- a double-clutch</p> <p>17 transmission or a standard transmission,</p> <p>18 automatics, manuals, again, that's going to</p> <p>19 have feedback from marketing and business</p> <p>20 development as to what they figure the</p> <p>21 estimated market size is for the product and</p> <p>22 the projected volumes.</p> <p>23 The projected volumes determine the</p> <p>24 paths we'll follow for manufacturing so at that</p> <p>25 point, we will start tying in the production</p>	<p style="text-align: right;">Page 63</p> <p>1 S. Becker</p> <p>2 guys as far as manufacturing methods that are</p> <p>3 available, and costs and timing.</p> <p>4 There's going to be the project</p> <p>5 management group that's going to start setting</p> <p>6 up the Gantt charts and the product timing</p> <p>7 windows, backing out each component to design</p> <p>8 concept, function, and ultimate delivery</p> <p>9 schedule for the early prototypes.</p> <p>10 Your simulation group's meanwhile</p> <p>11 working in the background evaluating a few of</p> <p>12 the various designs with the designers and the</p> <p>13 drafters. Their teams are meeting with -- they</p> <p>14 usually have a cross-functional team of</p> <p>15 manufacturing people, simulation people, and</p> <p>16 the core engineering and test development and</p> <p>17 verification people to sort of synthesize how</p> <p>18 that plan's going to go together.</p> <p>19 I think we're now to the point where</p> <p>20 we've got a -- a concept together. The</p> <p>21 components are going to start being</p> <p>22 manufactured. There's going to be supplier</p> <p>23 sourcing involvement so those guys are going to</p> <p>24 be negotiating with the business guys, with the</p> <p>25 various suppliers of the components or raw</p>
<p style="text-align: right;">Page 64</p> <p>1 S. Becker</p> <p>2 materials, depending for what types of</p> <p>3 materials we're going to use and --</p> <p>4 Q. Okay, why don't I just stop you at</p> <p>5 that point. On the -- the first part that you</p> <p>6 started to outline, you know, with all these</p> <p>7 various groups, these effectively work together</p> <p>8 in an iterative way?</p> <p>9 A. Correct.</p> <p>10 Q. How many -- sort of generally</p> <p>11 speaking, how many iterations would -- would a</p> <p>12 driveline design go through?</p> <p>13 A. For what?</p> <p>14 Q. To get to a completed product.</p> <p>15 A. Depends on the driveline. Like, say,</p> <p>16 a simple front-wheel drive vehicle, they're</p> <p>17 just going to ask for a set of ratios for the</p> <p>18 transmission. And then they're going to</p> <p>19 probably go through a few concepts of</p> <p>20 drivelines downstream of the transmission and</p> <p>21 differential.</p> <p>22 We may even change some of the gear</p> <p>23 ratios based on how the fuel economy guys</p> <p>24 give -- provide feedback. I know, like, just</p> <p>25 take the T350 that we were talking about. We</p>	<p style="text-align: right;">Page 65</p> <p>1 S. Becker</p> <p>2 had three different designs of fifth gear and</p> <p>3 two different designs of final drive ratio,</p> <p>4 which impacted the few economy and performance</p> <p>5 level of the vehicle.</p> <p>6 So there was a -- you know, various</p> <p>7 iterations available to the customer that the</p> <p>8 customer wouldn't even know about. And then</p> <p>9 some of these just disappeared. You know,</p> <p>10 we -- we decided not to use them.</p> <p>11 They can either drop out in design</p> <p>12 phase, they can drop out in development phase,</p> <p>13 or in production. I think in that design, we'd</p> <p>14 carried out three designs all the way out to</p> <p>15 production.</p> <p>16 Q. Are -- are all -- excuse me. Are</p> <p>17 all-wheel drive systems more complicated than</p> <p>18 four-wheel -- than front-wheel drive systems in</p> <p>19 terms of the driveline design aspect of it?</p> <p>20 A. Definitely. In the all-wheel drive</p> <p>21 configuration, you then have interaction more</p> <p>22 with the electronics guys and you have a -- a</p> <p>23 schema approach where it's a do you want to</p> <p>24 follow a torque vectoring concept or do you</p> <p>25 want to use a brake actuation control, more of</p>

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<p>1 S. Becker</p> <p>2 a mild all-wheel drive systems versus a</p> <p>3 stronger all-wheel drive system.</p> <p>4 And then there's going to be the</p> <p>5 interaction with marketing and things as to the</p> <p>6 performance level you want out of a vehicle.</p> <p>7 So let's take a -- a Chevy View --</p> <p>8 Chevy View? -- a Saturn View, which is the</p> <p>9 MV900 product that I'd worked on.</p> <p>10 In that one, they had a more mild</p> <p>11 all-wheel drive system so they worked with</p> <p>12 brake traction actuation. So in other words,</p> <p>13 let's say you go up a hill, and the hill's made</p> <p>14 of sand. In a Saturn View, you go up, it's</p> <p>15 going to stop and just stop, because the brakes</p> <p>16 are going to lock up because everything thinks</p> <p>17 it's slipping. Excuse me.</p> <p>18 You take an Audi up that same hill</p> <p>19 and it's going to walk up the whole hill</p> <p>20 because the Audi's got our torque vectoring</p> <p>21 system. So it's got independent clutches that</p> <p>22 are throwing --</p> <p>23 THE REPORTER: It's got</p> <p>24 independent?</p> <p>25 THE WITNESS: Independent -- what</p>	<p>1 S. Becker</p> <p>2 did I say? Independent clutches</p> <p>3 throwing the torque to each system. And</p> <p>4 that's still working with brake traction</p> <p>5 control, but it's going to actuate the</p> <p>6 brakes less and rely on the clutches</p> <p>7 more so that the vehicle has a higher</p> <p>8 off-road performance.</p> <p>9 BY MS. SHAH:</p> <p>10 Q. Okay. So then is it fair to say that</p> <p>11 driveline systems in general -- let -- let's</p> <p>12 talk about specifically for automotive</p> <p>13 vehicles, that they interact with a variety of</p> <p>14 other sort of vehicle systems within the car</p> <p>15 and that the driveline designer then has to</p> <p>16 work in conjunction with a variety of other</p> <p>17 engineers from different vehicle systems groups</p> <p>18 to sort of ensure that the overall performance</p> <p>19 characteristics of the vehicle are met?</p> <p>20 MS. MANDRUSIAK: Objection, form.</p> <p>21 A. That's definitely a -- a good overall</p> <p>22 characteristic, characterization of the</p> <p>23 driveline systems is that you have to work with</p> <p>24 the controls guys, the brakes guys, the engine</p> <p>25 folks, yeah. And the vehicle structure,</p>
Page 68	Page 69
<p>1 S. Becker</p> <p>2 because if the vehicle's all wobbly underneath,</p> <p>3 this thing's not going to work. Same thing</p> <p>4 with suspension.</p> <p>5 And that's what vehicle synthesis is</p> <p>6 supposed to be there for. Each OEM's going to</p> <p>7 have a vehicle synthesis group that's going to</p> <p>8 make sure that that communication's current</p> <p>9 between each component development group.</p> <p>10 Q. Of all the different sorts of sort of</p> <p>11 design work that's involved with the vehicle</p> <p>12 components, automotive vehicle components, is</p> <p>13 the driveline sort of system the one that's</p> <p>14 most interconnected with a variety of other</p> <p>15 vehicle systems?</p> <p>16 A. Not necessarily. It depends on the</p> <p>17 vehicle. You'd have to, you know, identify a</p> <p>18 specific vehicle if you want me to do that.</p> <p>19 Q. Okay. So is there another vehicle, I</p> <p>20 guess, let's say a -- it's another specific</p> <p>21 component that has this much of an interrelated</p> <p>22 kind of aspect from one vehicle system to</p> <p>23 another vehicle system?</p> <p>24 MS. MANDRUSIAK: Objection,</p> <p>25 foundation. Objection, form.</p>	<p>1 S. Becker</p> <p>2 A. Sure. Like, let's take suspension.</p> <p>3 Q. Okay.</p> <p>4 A. In addition to having to work with</p> <p>5 the -- the vehicle driveline people, the</p> <p>6 suspension's got to respond to the powertrain.</p> <p>7 In other words, it's got to be able to respond</p> <p>8 to taking that torque up as well as creating</p> <p>9 the handling characteristics, which interacts</p> <p>10 again with the vehicle controls as well as the</p> <p>11 electronics now because now we have electronic</p> <p>12 suspension systems.</p> <p>13 And then they've also got to work</p> <p>14 tightly with the body in white people and the</p> <p>15 vehicle structure component groups because they</p> <p>16 need to have a vehicle stiffness target and the</p> <p>17 structural attachment points for the suspension</p> <p>18 that the body in white's going to ride on.</p> <p>19 The electronics guys doing the</p> <p>20 control modules and power distribution center</p> <p>21 system, they've got to work with the driveline</p> <p>22 guys if we've got electronics because they've</p> <p>23 got to supply us power. They, of course, work</p> <p>24 with engine, engine controls, IP, radio, HVA/C</p> <p>25 group, the illumination group, the headlight</p>

<p style="text-align: right;">Page 70</p> <p>1 S. Becker</p> <p>2 group, the interiors group. There -- there's</p> <p>3 quite a dynamic interaction there.</p> <p>4 Q. Okay. Let's -- let's back up.</p> <p>5 What's -- what's the sort of -- what's the</p> <p>6 fundamental purpose of a driveline system?</p> <p>7 A. Deliver power from the engine to the</p> <p>8 wheels.</p> <p>9 Q. What are the primary considerations</p> <p>10 involved in designing a driveline system?</p> <p>11 A. Well, one, you've ratios. In other</p> <p>12 words, a direct drive system doesn't tend to</p> <p>13 function well. In other words, you don't just</p> <p>14 connect the engine directly to the wheel.</p> <p>15 So first off, you have a ratio based</p> <p>16 on the wheel itself. The size of the wheel is</p> <p>17 a ratio.</p> <p>18 Secondly, you have the ratios in the</p> <p>19 axles if you have axles and you have ratios in</p> <p>20 the transmissions. And those are going to all</p> <p>21 modify how the engine power is delivered to the</p> <p>22 wheels.</p> <p>23 Two, you've got NVH, noise,</p> <p>24 vibration, and harshness. In other words,</p> <p>25 driveline clunk, driveline vibration, noise,</p>	<p style="text-align: right;">Page 71</p> <p>1 S. Becker</p> <p>2 whirl, shudder, quite a few things.</p> <p>3 Then you have the efficiencies or</p> <p>4 losses, and that's going to affect your CAFE</p> <p>5 and your fuel economy ratings as well as your</p> <p>6 emissions because the engine again's trying to</p> <p>7 be optimized for emissions. But that's based</p> <p>8 on how hard we make the engine work based on</p> <p>9 the driveline system.</p> <p>10 So there, you've got your control</p> <p>11 scheme, your efficiency losses through each</p> <p>12 component, whether that's friction or heat or</p> <p>13 slippage.</p> <p>14 Then you've got your stiffness. The</p> <p>15 various stiffnesses are going to create the</p> <p>16 responsiveness of the driveline as well as the</p> <p>17 NVH characteristics.</p> <p>18 Then you've got durability, of</p> <p>19 course, how long you want the thing to live,</p> <p>20 cycle count, how hard it's going to be used,</p> <p>21 and cost. And again weight, which is going to</p> <p>22 go back to your fuel economy and your vehicle</p> <p>23 responsiveness. And then sizing the engine, of</p> <p>24 course.</p> <p>25 I don't know if I left anything out.</p>
<p style="text-align: right;">Page 72</p> <p>1 S. Becker</p> <p>2 I think that's it.</p> <p>3 Q. Was there a specific driveline sort</p> <p>4 of innovation group at -- at Chrysler or Magna</p> <p>5 or the companies that you worked with before?</p> <p>6 A. Yeah, we -- we had sort of three</p> <p>7 structures while I was working at each company.</p> <p>8 Q. Okay.</p> <p>9 A. At one point in time there was the</p> <p>10 advanced products group that was responsible</p> <p>11 for coming up with new ideas, sending them</p> <p>12 through me and the other groups.</p> <p>13 They would also do competitive</p> <p>14 product evaluation so we would buy everybody</p> <p>15 else's driveline components and test them and</p> <p>16 tear them apart and evaluate their cost and</p> <p>17 everything else.</p> <p>18 And then that progressed to a point</p> <p>19 where the advanced design development came from</p> <p>20 one area and they transitioned into production;</p> <p>21 other times, they were just in charge of</p> <p>22 advanced stuff. So it depended on I guess</p> <p>23 management structure at the time, whether they</p> <p>24 were going with a matrix or a flow-through or a</p> <p>25 broad products group.</p>	<p style="text-align: right;">Page 73</p> <p>1 S. Becker</p> <p>2 Chrysler? Chrysler had the design</p> <p>3 lab. They were doing the sort of appearance,</p> <p>4 and they would work with marketing on function.</p> <p>5 And then, of course, you had products</p> <p>6 that were already in production so you had the</p> <p>7 cost reduction and problem solutions analysis</p> <p>8 groups. They would work with the products that</p> <p>9 are in production, not advanced, not new</p> <p>10 products, so I guess that was like another</p> <p>11 separation.</p> <p>12 Q. Okay. Were you part of this advanced</p> <p>13 product development group?</p> <p>14 A. I was part of all the groups.</p> <p>15 Q. At different points in time,</p> <p>16 depending on --</p> <p>17 A. No, I --</p> <p>18 Q. -- the --</p> <p>19 A. -- was part of all the groups at all</p> <p>20 points in time. I had the weirdest job in the</p> <p>21 company.</p> <p>22 Q. Okay.</p> <p>23 A. When cost reduction had a change, it</p> <p>24 had to go through me for valid -- for</p> <p>25 verification. When new products had an idea,</p>

<p style="text-align: right;">Page 74</p> <p>1 S. Becker</p> <p>2 they had to go through me for part of the team</p> <p>3 evaluation of the product. Existing product</p> <p>4 development, of course, that was more obvious</p> <p>5 that it had to go through me for product</p> <p>6 evaluation and end of line development. So all</p> <p>7 the groups worked through me or my group.</p> <p>8 Q. And that's because the -- one of the</p> <p>9 core areas that you were involved in was</p> <p>10 verification?</p> <p>11 A. Yeah, the testing and everything</p> <p>12 else. And as well as the gear design, because</p> <p>13 all -- all of our products had some sort of</p> <p>14 gearing involved or chain system involved.</p> <p>15 Q. So to sort of summarize, the -- the</p> <p>16 work that you did mostly was with respect to</p> <p>17 gear design and verification?</p> <p>18 A. It's hard to characterize it that</p> <p>19 way. No, I wouldn't characterize it like that.</p> <p>20 The gear development center when I</p> <p>21 was a part of that group was primarily focused</p> <p>22 on that, but I was taking on structures and</p> <p>23 other components of -- of the products.</p> <p>24 Q. On the engineering side, would you</p> <p>25 say the majority of your work with respect to</p>	<p style="text-align: right;">Page 75</p> <p>1 S. Becker</p> <p>2 designing was with respect to gear design and</p> <p>3 then verification of related systems?</p> <p>4 A. For a portion of the time, yes; for</p> <p>5 another portion, no. I gave up the gearing</p> <p>6 work to Bob Wilson's group somewhere around the</p> <p>7 mid -- mid period of time that I was working</p> <p>8 there and focused on overall product</p> <p>9 development.</p> <p>10 Q. In your capacity sort of -- strike</p> <p>11 that.</p> <p>12 While you were working on product</p> <p>13 development, did you have to interface with the</p> <p>14 electronic engineers for purposes of driveline</p> <p>15 control systems?</p> <p>16 A. Definitely.</p> <p>17 Q. What was the nature of the iterative</p> <p>18 process between your product development work</p> <p>19 and the control side?</p> <p>20 A. Sure. Anything they developed as far</p> <p>21 as controls were involved needed both product</p> <p>22 durability testing, so we were working with the</p> <p>23 module suppliers as well as the electronics</p> <p>24 shift actuator suppliers developing and</p> <p>25 designing how their products would be evaluated</p>
<p style="text-align: right;">Page 76</p> <p>1 S. Becker</p> <p>2 for product durability and function. And then</p> <p>3 whenever they needed testing, they had -- they</p> <p>4 went through my group.</p> <p>5 Q. Were you ever involved in designing</p> <p>6 controls?</p> <p>7 A. No. I was part of the team that was</p> <p>8 designing the overall fit and function of the</p> <p>9 product which would define the controls, the</p> <p>10 end game of the control structure, but I wasn't</p> <p>11 doing the actual controls.</p> <p>12 Q. Do you understand what's involved</p> <p>13 with designing the controls to fit I guess to</p> <p>14 satisfy, quote-unquote, "overall fit and</p> <p>15 function"?</p> <p>16 A. Definitely.</p> <p>17 Q. But you've never been in -- actually</p> <p>18 involved in the design of those control</p> <p>19 systems?</p> <p>20 A. Correct. Well, again except for</p> <p>21 concept and durability. So like, for example,</p> <p>22 we had one product in a GM vehicle, and the</p> <p>23 control scheme had a shift actuator. And the</p> <p>24 shift actuator's basically an electric motor</p> <p>25 with a gearset. And that actuator interacts</p>	<p style="text-align: right;">Page 77</p> <p>1 S. Becker</p> <p>2 with the shift select lever and the clutch</p> <p>3 apply system.</p> <p>4 They needed a sensor to tell them</p> <p>5 where they were, and the sensors were getting</p> <p>6 eaten into to the point where if the person</p> <p>7 didn't shift the vehicle for a long period of</p> <p>8 time, the fingers that told it where it was</p> <p>9 would lose signal and it would not know where</p> <p>10 to go.</p> <p>11 So I had to come up with a means of</p> <p>12 finding out how this could happen, work with</p> <p>13 the controls guys for how to solve the problem,</p> <p>14 and then verify that the problem was solved.</p> <p>15 Q. Okay.</p> <p>16 A. And so --</p> <p>17 Q. I'm sorry. Are you --</p> <p>18 A. Sorry.</p> <p>19 Q. -- finished?</p> <p>20 A. That -- that resulted in a new</p> <p>21 product.</p> <p>22 Q. All right. With respect to driveline</p> <p>23 systems, have you been involved in designing</p> <p>24 the control modules that implement the -- the</p> <p>25 control strategy for a driveline system?</p>

<p style="text-align: right;">Page 78</p> <p>1 S. Becker</p> <p>2 MS. MANDRUSIAK: Objection, form.</p> <p>3 A. Not with the electronics themselves</p> <p>4 but with the testing of the electronics</p> <p>5 controls modules both for their output and</p> <p>6 durability.</p> <p>7 Q. Do you consider yourself to be an</p> <p>8 expert in driveline design?</p> <p>9 A. Yes.</p> <p>10 Q. And what are the -- what credentials</p> <p>11 would you point to to satisfy that -- I guess,</p> <p>12 your -- your opinion?</p> <p>13 A. My work expertise and past history.</p> <p>14 In other words, I've designed and been involved</p> <p>15 with various components of the design of both</p> <p>16 front-wheel drive vehicles, rear-wheel drive</p> <p>17 vehicles, all-wheel drive vehicles, four-wheel</p> <p>18 drive vehicles, and electric vehicles, and</p> <p>19 every variety of those.</p> <p>20 Q. What other areas do you consider to</p> <p>21 be an expert in?</p> <p>22 A. You want a list?</p> <p>23 Q. Is it extensive?</p> <p>24 A. It is extensive.</p> <p>25 Q. Does it exist in -- is it something</p>	<p style="text-align: right;">Page 79</p> <p>1 S. Becker</p> <p>2 more than what exists in -- on -- in the Robson</p> <p>3 Forensic Exhibit 1 that we -- we looked at</p> <p>4 earlier?</p> <p>5 A. Yeah. In here, you would see</p> <p>6 driveline systems and powertrain systems,</p> <p>7 steering, braking, bumpers, structure,</p> <p>8 photogrammetry, acoustics, white water</p> <p>9 kayaking, materials failure analysis, general</p> <p>10 mechanical engineering stuff. So I would</p> <p>11 consider myself an expert in mechanical</p> <p>12 engineering.</p> <p>13 MS. MANDRUSIAK: It's been about an</p> <p>14 hour and a half. Is this a good time</p> <p>15 for a break?</p> <p>16 MS. SHAH: Sure.</p> <p>17 (Recess taken.)</p> <p>18 MS. SHAH: I'd like to mark this.</p> <p>19 (Becker Exhibit No. 2 was marked for</p> <p>20 identification.)</p> <p>21 BY MS. SHAH:</p> <p>22 Q. If you could, read the title of</p> <p>23 what's been marked as Exhibit 2.</p> <p>24 A. It's an SAE paper, 2006-01-0580,</p> <p>25 all-wheel drive -- "All-wheel Driveline</p>
<p style="text-align: right;">Page 80</p> <p>1 S. Becker</p> <p>2 Mechatronic Systems: Principles of Wheel Power</p> <p>3 Management."</p> <p>4 Q. What's your understanding of</p> <p>5 mechatronics?</p> <p>6 A. That -- that goes back to basically</p> <p>7 the control electronics. Mechatronics are</p> <p>8 electronic systems that control mechanical</p> <p>9 systems.</p> <p>10 Q. And who's the author of this SAE</p> <p>11 article that's --</p> <p>12 A. Vladimir --</p> <p>13 Q. -- Exhibit 2?</p> <p>14 A. Valdimir Vantsevich.</p> <p>15 Q. Are you familiar with him?</p> <p>16 A. I'm familiar with Lawrence Tech. I</p> <p>17 don't know that I recall Vladimir.</p> <p>18 Q. Okay. If you could turn to -- just</p> <p>19 underneath on the first page there's an</p> <p>20 introduction section.</p> <p>21 Do you see that?</p> <p>22 A. Definitely.</p> <p>23 Q. The first paragraph of the</p> <p>24 introduction section discusses sort of two key</p> <p>25 elements.</p>	<p style="text-align: right;">Page 81</p> <p>1 S. Becker</p> <p>2 Do you see that part?</p> <p>3 A. Yes.</p> <p>4 Q. If you could read that sentence.</p> <p>5 A. "There are two key elements in this</p> <p>6 definition." And I believe he's defining a</p> <p>7 driveline system. "The driveline system</p> <p>8 location, a part of the powertrain located</p> <p>9 after the transmission, and the purpose of the</p> <p>10 driveline system, to distribute power among the</p> <p>11 drive wheels."</p> <p>12 Q. And then if you could read the second</p> <p>13 sentence, please.</p> <p>14 A. "The subject of this paper is to</p> <p>15 present principles for optimizing wheel power</p> <p>16 distributions and then for designing optimum</p> <p>17 real -- optimum driveline systems that provide</p> <p>18 vehicles with the best performance compared to</p> <p>19 [sic] other driveline systems can do."</p> <p>20 Q. What's your understanding of torque</p> <p>21 vectoring?</p> <p>22 A. Torque vectoring is the control</p> <p>23 scheme for applying torque to a wheel that will</p> <p>24 aid in your handling.</p> <p>25 Q. Are there specific hardwares that</p>

<p style="text-align: right;">Page 82</p> <p>1 S. Becker</p> <p>2 facilitate torque vectoring?</p> <p>3 A. Definitely.</p> <p>4 Q. What kind of -- can you describe the</p> <p>5 sorts of hardware arrangements that help</p> <p>6 facilitate torque vectoring?</p> <p>7 A. Yeah. You would need to be able to</p> <p>8 manipulate the torque and speed to each of the</p> <p>9 four wheels, so you need some form of all-wheel</p> <p>10 drive. Generally, that's performed or achieved</p> <p>11 by a clutch pack actuation system.</p> <p>12 Q. And can you describe what -- what do</p> <p>13 you mean by "clutch pack actuation system"?</p> <p>14 A. An actuation system that activates a</p> <p>15 clutch pack that will control the torque and</p> <p>16 speed for each wheel. It can also be achieved</p> <p>17 by electronic power drive at each wheel with</p> <p>18 a -- wheel hub motors or types of devices.</p> <p>19 Q. Is there a preferred hardware</p> <p>20 arrangement to facilitate torque vectoring?</p> <p>21 A. Not that I'm aware of.</p> <p>22 Q. Is -- is there a distinction between</p> <p>23 mechatronic systems and automated mechanical</p> <p>24 systems?</p> <p>25 A. Sure. A mechatronic system performs</p>	<p style="text-align: right;">Page 83</p> <p>1 S. Becker</p> <p>2 to a specified set of inputs. In other words,</p> <p>3 you see slip, do this. The other one you</p> <p>4 stated, can you restate that?</p> <p>5 Q. Yes, it's automated mechanical</p> <p>6 systems.</p> <p>7 A. Automated mechanical systems</p> <p>8 determine when they want to interact with your</p> <p>9 mechanical system all by themselves. They have</p> <p>10 a sort of brain.</p> <p>11 Q. What do you mean by they have --</p> <p>12 I'm -- I'm not clear on your answer. What do</p> <p>13 you mean by "they have a sort of brain"?</p> <p>14 A. A mechatronic system generally is</p> <p>15 defined as an electronic system interacting</p> <p>16 with just a mechanical system. That's going to</p> <p>17 have a controller, but it's going to follow a</p> <p>18 prescribed pattern.</p> <p>19 An automated system is going to do</p> <p>20 that all by itself. It's going to decide all</p> <p>21 by itself when it wants to apply stuff.</p> <p>22 Q. Which provides more flexibility, a</p> <p>23 mechatronic system or an automated mechanical</p> <p>24 system?</p> <p>25 A. Depends on how well you design your</p>
<p style="text-align: right;">Page 84</p> <p>1 S. Becker</p> <p>2 mechatronic system. They could both provide</p> <p>3 the same function and flexibility, but an</p> <p>4 automated system theoretically being able to</p> <p>5 come up with its own solutions would</p> <p>6 potentially be more flexible.</p> <p>7 Q. So if you could turn to, again on the</p> <p>8 first page of Exhibit 2, the right-hand column,</p> <p>9 the first full paragraph, the last sentence of</p> <p>10 that first full paragraph, it starts with "The</p> <p>11 driveline mechatronic systems."</p> <p>12 Do you see that?</p> <p>13 A. Yeah. That's backwards.</p> <p>14 Q. So you -- I'm sorry, could you read</p> <p>15 that sentence?</p> <p>16 A. Oh, sorry.</p> <p>17 Q. And then tell me if you agree or</p> <p>18 disagree with that characterization.</p> <p>19 A. "The driveline mechatronic systems</p> <p>20 are more flexible and proactive in distributing</p> <p>21 the engine power to the wheels than automated</p> <p>22 mechanical systems, e.g., numerous of limited</p> <p>23 slip differentials, mechanically electronically</p> <p>24 lockable differentials, viscous clutches, no</p> <p>25 spins, on-demand systems, and many others."</p>	<p style="text-align: right;">Page 85</p> <p>1 S. Becker</p> <p>2 So in here, no longer speaking from</p> <p>3 him, he's defining what he's calling an</p> <p>4 automated mechanical system.</p> <p>5 Q. Okay. Is that consistent with</p> <p>6 what -- your understanding of what an automated</p> <p>7 mechanical system includes?</p> <p>8 A. No, no. What he's describing is a</p> <p>9 passive system.</p> <p>10 Q. Okay. So based on the</p> <p>11 characterization as he's defined it in this</p> <p>12 last sentence of the paragraph that you were</p> <p>13 just reading from, do you agree with this</p> <p>14 characterization?</p> <p>15 MS. MANDRUSIAK: Objection, form.</p> <p>16 A. A -- a mechatronic system would be</p> <p>17 more flexible than a passive system, yes.</p> <p>18 BY MS. SHAH:</p> <p>19 Q. What are the advantages of having a</p> <p>20 more flexible system?</p> <p>21 A. You can adapt to how much you apply</p> <p>22 torque or slip.</p> <p>23 Q. How you would apply torque and slip</p> <p>24 to a wheel? That's what you're --</p> <p>25 A. Of course.</p>

<p style="text-align: right;">Page 86</p> <p>1 S. Becker</p> <p>2 Q. -- referring to?</p> <p>3 A. Yes.</p> <p>4 Q. So then moving on to the last</p> <p>5 paragraph of page 1 of Exhibit 2, there's a</p> <p>6 sentence in here. If you could read the first</p> <p>7 sentence of that paragraph, please.</p> <p>8 A. "Another contemporary tendency in the</p> <p>9 driveline system design relates to networking</p> <p>10 with other vehicle systems such as steering</p> <p>11 system, brakes, suspension systems, and</p> <p>12 others."</p> <p>13 Q. Okay. And do you agree that there's</p> <p>14 that sort of interrelationship between this</p> <p>15 sort of networking, as he refers to it, between</p> <p>16 driveline systems and other vehicle systems?</p> <p>17 A. Yes. We use the CAN bus to look at,</p> <p>18 say, the steering yaw rate or the application</p> <p>19 of brakes or if there's an electronic</p> <p>20 suspension travel monitoring system to vary our</p> <p>21 driveline system function.</p> <p>22 Q. Can you describe for me what the --</p> <p>23 the -- I guess the operation and the function</p> <p>24 of the CAN bus is?</p> <p>25 A. Sure. The CAN bus is the</p>	<p style="text-align: right;">Page 87</p> <p>1 S. Becker</p> <p>2 communication system that distributes</p> <p>3 information across the car from the engine</p> <p>4 control modules to the transmission control</p> <p>5 module to the transfer case control module,</p> <p>6 which in this case would be an all-wheel drive</p> <p>7 control system module, as well as some of the</p> <p>8 other signals.</p> <p>9 Basically, it's the routing of all</p> <p>10 sensors so that they can be read by everybody.</p> <p>11 Q. So if you could turn to page 2 of</p> <p>12 Exhibit 2, please. So if you can look at the</p> <p>13 second-to-last sentence of the first paragraph</p> <p>14 that starts with "For example."</p> <p>15 A. Correct. "For example, a vehicle</p> <p>16 with four drive wheels has three power dividing</p> <p>17 units. The first one is the transfer case.</p> <p>18 Two more units are installed on the front and</p> <p>19 rear axles. See figure 2."</p> <p>20 Q. And then if you could read the</p> <p>21 sentence just below that, please.</p> <p>22 A. "As seen from this, combinations of</p> <p>23 the mechanisms and subsystems that could be</p> <p>24 employed for these three PDUs are practically</p> <p>25 uncountable."</p>
<p style="text-align: right;">Page 88</p> <p>1 S. Becker</p> <p>2 Q. And do you agree with the</p> <p>3 characterization in these two sentences?</p> <p>4 A. Not exactly.</p> <p>5 Q. And why not?</p> <p>6 A. Well, it's easily countable. But you</p> <p>7 have many combinations so the overall</p> <p>8 characterization is correct.</p> <p>9 Q. Okay. So if I'm understanding the</p> <p>10 final sentence of that paragraph, he's talking</p> <p>11 about combination of -- combinations of</p> <p>12 mechanisms and subsystems that could be</p> <p>13 employed by three PDUs, power dividing units.</p> <p>14 What are the different kinds of</p> <p>15 mechanisms and subsystems that could be</p> <p>16 employed?</p> <p>17 MS. MANDRUSIAK: Objection,</p> <p>18 foundation.</p> <p>19 A. He's referring to likely control</p> <p>20 mechanisms and subsystems. In other words, the</p> <p>21 vehicle can look at steering, suspension,</p> <p>22 braking, throttle, road vibration, I guess</p> <p>23 torque output. You could look at any number of</p> <p>24 sensors that you wanted to and then control</p> <p>25 them in different fashions.</p>	<p style="text-align: right;">Page 89</p> <p>1 S. Becker</p> <p>2 Q. So then --</p> <p>3 A. Control the PDUs in different</p> <p>4 fashions based on this.</p> <p>5 Q. Okay. So then is it accurate if you</p> <p>6 had such a wide range of mechanisms and</p> <p>7 subsystems that there would be a very</p> <p>8 significant number of permutations of how you</p> <p>9 could arrange -- how you could employ the three</p> <p>10 PDUs to take into consideration the various</p> <p>11 mechanisms and subsystems?</p> <p>12 MS. MANDRUSIAK: Objection, form.</p> <p>13 A. Yeah, in general, that's the concept,</p> <p>14 that depending on what you're reading from</p> <p>15 these other systems, you would change how you</p> <p>16 control your PDUs, as he's calling them.</p> <p>17 Q. How do you decide what's optimal,</p> <p>18 then?</p> <p>19 If you've got such a large number of</p> <p>20 potential combinations, how does a driveline</p> <p>21 designer determine what is optimal, an optimal</p> <p>22 driveline design?</p> <p>23 A. They don't.</p> <p>24 Q. So then how do they go about</p> <p>25 driveline design?</p>

<p style="text-align: right;">Page 90</p> <p>1 S. Becker</p> <p>2 A. That's going to be defined by</p> <p>3 marketing and the vehicle concept group. In</p> <p>4 other words, they're going to want the vehicle</p> <p>5 to do something.</p> <p>6 Q. Okay.</p> <p>7 A. They're going to want the vehicle to</p> <p>8 be, as they call them, fun and sporty, which</p> <p>9 means cheap. So you're not going to put a</p> <p>10 really complicated driveline system on that</p> <p>11 vehicle.</p> <p>12 You're going to put as much safety as</p> <p>13 you can into that, you know, just as you would</p> <p>14 for any other vehicle, but the driveline</p> <p>15 control schema is not going to be as complex as</p> <p>16 a top-end, higher priced, more cost involved in</p> <p>17 the driveline system vehicle.</p> <p>18 So then let's just define we're</p> <p>19 working on one all-wheel drive vehicle system.</p> <p>20 On that vehicle, we've got given inputs. We</p> <p>21 want to control this the best we can. Money's</p> <p>22 no object. So there, you're going to have a</p> <p>23 full-on torque vectoring system. You're going</p> <p>24 to employ as many sensor readings as you can to</p> <p>25 then control and minimize yaw events and other</p>	<p style="text-align: right;">Page 91</p> <p>1 S. Becker</p> <p>2 undesirable handling characteristics.</p> <p>3 But you don't have an optimum design,</p> <p>4 single optimum design. It's going to be</p> <p>5 different for a car than it is for a truck.</p> <p>6 It's going to be different for an off-road</p> <p>7 vehicle than it is a soccer mom SUV.</p> <p>8 Q. Okay. So with respect to, let's say,</p> <p>9 the differences for a conventional -- let's --</p> <p>10 all-wheel drive vehicle for traditional routes</p> <p>11 as compared to an ATV, what would be the</p> <p>12 different considerations?</p> <p>13 And how would that affect the</p> <p>14 driveline design?</p> <p>15 A. Well --</p> <p>16 MS. MANDRUSIAK: Objection, form.</p> <p>17 A. -- it depends on what you mean by ATV</p> <p>18 because like in England, an ATV's an</p> <p>19 all-terrain vehicle.</p> <p>20 BY MS. SHAH:</p> <p>21 Q. Okay.</p> <p>22 A. And that includes Jeeps, trucks, Land</p> <p>23 Rovers, etc. An ATV is going to be in America</p> <p>24 a lower cost vehicle and it's going to be only</p> <p>25 driven off-road. So an on-road vehicle -- so</p>
<p style="text-align: right;">Page 92</p> <p>1 S. Becker</p> <p>2 let's say we're talking a small SUV. Again,</p> <p>3 it's going to depend on the -- the luxurt</p> <p>4 refinement of that vehicle.</p> <p>5 The control -- the control schema for</p> <p>6 a Honda is not the same as it is for the -- for</p> <p>7 the Audi -- or for the Acura, you know, so</p> <p>8 they've got their two different levels of trim.</p> <p>9 THE REPORTER: Of? Of trim?</p> <p>10 THE WITNESS: Trim.</p> <p>11 THE REPORTER: Thank you.</p> <p>12 A. So you have to define that.</p> <p>13 BY MS. SHAH:</p> <p>14 Q. Okay. So apart from the -- sort of</p> <p>15 the differences between, let's say, a base</p> <p>16 model and a luxury model, are there differences</p> <p>17 that are relevant in terms of the ultimate</p> <p>18 terrain from a -- you know, conventional roads</p> <p>19 to off-roading?</p> <p>20 Is that relevant from a driveline</p> <p>21 design perspective?</p> <p>22 A. Off-road versus on-road only?</p> <p>23 Q. Yes.</p> <p>24 A. Definitely.</p> <p>25 Q. Principally.</p>	<p style="text-align: right;">Page 93</p> <p>1 S. Becker</p> <p>2 A. Yeah. Principally, your on-road</p> <p>3 control schema is going to be more concerned</p> <p>4 with handling characteristics; your off-road</p> <p>5 control schema is going to be more concerned</p> <p>6 with slipping.</p> <p>7 Q. Are there any other relevant factors</p> <p>8 between on-road versus off-road considerations</p> <p>9 for driveline design purposes?</p> <p>10 A. Ratio. Off-road, you're going to</p> <p>11 develop a -- a secondary ratio, usually for</p> <p>12 delivering more power to the wheels because</p> <p>13 you're going to be operating at slower speeds,</p> <p>14 except in the case of our off-road race</p> <p>15 vehicles where we're operating at high speeds</p> <p>16 so that we use a different type of underdrive</p> <p>17 ratio. So again, it's ratio based.</p> <p>18 And again, you could do that in your</p> <p>19 on-road vehicle as well so it -- it's not a</p> <p>20 clear -- clear-cut division.</p> <p>21 Q. So I guess the question is there's a</p> <p>22 variety of things that one could do as part of</p> <p>23 driveline design.</p> <p>24 What determines -- what are the</p> <p>25 primary factors that determine what</p>



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<p>1 S. Becker</p> <p>2 functionality ultimately is included in the</p> <p>3 driveline design?</p> <p>4 What are the -- what are the</p> <p>5 considerations that drive that design process?</p> <p>6 MS. MANDRUSIAK: Objection, form.</p> <p>7 A. Again, that's usually going to be</p> <p>8 decided at the OEM level, and that's going to</p> <p>9 be based on weight and cost.</p> <p>10 BY MS. SHAH:</p> <p>11 Q. Are there any --</p> <p>12 A. And then --</p> <p>13 Q. -- other considerations?</p> <p>14 A. And then -- and then the marketing of</p> <p>15 the vehicle, whether they're going to be a</p> <p>16 sporty car or a -- a conventional riding</p> <p>17 vehicle.</p> <p>18 Q. Okay. If we could turn to -- again</p> <p>19 sticking to page 2 of the -- this Exhibit 2,</p> <p>20 the SAE article, if you could look under the</p> <p>21 heading "Vehicle Dynamics Versus Vehicle</p> <p>22 Performance in Driveline Systems Design," if</p> <p>23 you could read the first sentence under that</p> <p>24 heading, please.</p> <p>25 A. "Dynamics and performance of vehicles</p>	<p>1 S. Becker</p> <p>2 with four or more drive wheels result from</p> <p>3 vehicle operational properties such as energy,</p> <p>4 fuel efficiency --" I forgot fuel efficiency</p> <p>5 "-- cross country mobility, tractive and</p> <p>6 velocity properties, vehicle turnability, and</p> <p>7 stability of motion and handling."</p> <p>8 Q. Do you agree with that --</p> <p>9 THE REPORTER: I'm sorry, repeat.</p> <p>10 MS. SHAH: Yeah, sure.</p> <p>11 BY MS. SHAH:</p> <p>12 Q. Do you agree with that</p> <p>13 characterization?</p> <p>14 A. Yeah, generally. I think he's got</p> <p>15 them all in there.</p> <p>16 Q. Then if you could continue to the</p> <p>17 next sentence and read that sentence, please.</p> <p>18 A. "No doubt these vehicle operational</p> <p>19 properties considerably depend on total power</p> <p>20 applied to the drive wheels. This --" yeah,</p> <p>21 period.</p> <p>22 Q. Do you agree with that as well?</p> <p>23 A. Yeah, for the most part, yeah.</p> <p>24 Q. Then the final sentence of that</p> <p>25 paragraph, please.</p>
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<p>1 S. Becker</p> <p>2 A. "At the same time, the listed</p> <p>3 operational properties strongly depend on the</p> <p>4 distribution of total power among the drive</p> <p>5 wheels." Oh, that was the next sentence.</p> <p>6 Sorry.</p> <p>7 "In the given road terrain</p> <p>8 conditions, the same vehicle with a constant</p> <p>9 total power at the drive wheels but with</p> <p>10 different power distribution among the drive</p> <p>11 axles and left and right wheels of each axle</p> <p>12 will perform differently, that is, the criteria</p> <p>13 of the above-listed operational properties will</p> <p>14 have different quantities."</p> <p>15 Q. And do you agree with those two</p> <p>16 sentences?</p> <p>17 A. Definitely.</p> <p>18 Q. All right. So then if you see,</p> <p>19 there's a figure 3 here that's also on the same</p> <p>20 page, page 2 of Exhibit 2.</p> <p>21 Do you see that figure?</p> <p>22 A. I do, sort of.</p> <p>23 Q. It's a little small.</p> <p>24 A. I see it but I can't necessarily</p> <p>25 make --</p>	<p>1 S. Becker</p> <p>2 Q. Make it out?</p> <p>3 A. -- out everything without my cell</p> <p>4 phone magnifier maybe.</p> <p>5 Q. So do you have your cell phone? Feel</p> <p>6 free to magnify it.</p> <p>7 A. Okay. That might help. Interesting.</p> <p>8 Okay.</p> <p>9 Q. You can see? You're able to see</p> <p>10 figure 3 now?</p> <p>11 A. Yeah.</p> <p>12 Q. All right. So you see the -- the</p> <p>13 sort of box that's identified as "driveline</p> <p>14 system"?</p> <p>15 A. Yes.</p> <p>16 Q. And that sort of interconnection that</p> <p>17 the driveline system has with respect to the</p> <p>18 three sort of boxes above that that describe</p> <p>19 various vehicle operational properties?</p> <p>20 A. Yeah. He's got like a -- a box</p> <p>21 around tractive velocities, etc., off-road</p> <p>22 mobility, and handling.</p> <p>23 Q. And also fuel consumption and</p> <p>24 turnability. Do you see that?</p> <p>25 A. Yeah.</p>

<p style="text-align: right;">Page 98</p> <p>1 S. Becker</p> <p>2 Q. Stability of motion?</p> <p>3 A. I was just identifying the boxes.</p> <p>4 Q. Okay. And do you agree that the</p> <p>5 driveline -- driveline systems essentially have</p> <p>6 to, you know, sort of factor in those -- at a</p> <p>7 minimum, these operational parameters that are</p> <p>8 identified in the three boxes that are</p> <p>9 connected to the driveline system in this</p> <p>10 chart?</p> <p>11 A. Well, it also contributes to</p> <p>12 smoothness of ride.</p> <p>13 Q. Okay. And is there also a</p> <p>14 relationship between driveline systems and</p> <p>15 braking capability?</p> <p>16 A. Depends on what you include in the</p> <p>17 driveline systems. Some people include brake</p> <p>18 traction control as part of the driveline</p> <p>19 system. I don't. Apparently, he doesn't</p> <p>20 either.</p> <p>21 Q. Okay. And the steering?</p> <p>22 Is there also a relationship between</p> <p>23 the -- I guess the driveline systems and the</p> <p>24 desired steering control properties?</p> <p>25 A. Well, that's the handling.</p>	<p style="text-align: right;">Page 99</p> <p>1 S. Becker</p> <p>2 Q. Okay.</p> <p>3 A. And turnability.</p> <p>4 Q. All right. So is there anything else</p> <p>5 you would add or subtract from this chart with</p> <p>6 respect to the relationship of driveline</p> <p>7 systems to vehicle operational properties that</p> <p>8 are relevant from a design standpoint?</p> <p>9 A. NVH.</p> <p>10 Q. Okay.</p> <p>11 A. And yeah just NVH. Probably also</p> <p>12 durability. He doesn't have durability in</p> <p>13 there.</p> <p>14 Q. Durability of the system as a whole,</p> <p>15 you're saying?</p> <p>16 A. Correct. Of the driveline system.</p> <p>17 Q. Uh-huh.</p> <p>18 A. And I didn't peer review this paper</p> <p>19 so this is my first look at it.</p> <p>20 Q. Sure. You -- you've not seen this</p> <p>21 paper before?</p> <p>22 A. Correct.</p> <p>23 Q. This Exhibit 2 paper.</p> <p>24 All right then, if you could look at</p> <p>25 the sort of paragraph that's underneath figure</p>
<p style="text-align: right;">Page 100</p> <p>1 S. Becker</p> <p>2 3 where he's -- the author is describing a</p> <p>3 methodology for designing a driveline system,</p> <p>4 if you could read that --</p> <p>5 A. Section?</p> <p>6 Q. -- out loud. Yes, please.</p> <p>7 A. "Based on the presented materials,</p> <p>8 one could notice that a methodology for</p> <p>9 designing driveline systems should provide a</p> <p>10 way to optimally manage power distributions to</p> <p>11 the drive wheels and to determine the optimum</p> <p>12 characteristics of driveline systems based on</p> <p>13 the criteria of the operational properties and</p> <p>14 link these vehicle operational properties'</p> <p>15 optimization with vehicle dynamics improvement</p> <p>16 and finally lead to the -- the required vehicle</p> <p>17 performance and technical efficiency."</p> <p>18 Q. Do you agree that that's effectively</p> <p>19 sort of the overall methodology that a</p> <p>20 driveline designer utilizes?</p> <p>21 A. Well, it -- it ignores cost and</p> <p>22 durability --</p> <p>23 Q. And --</p> <p>24 A. -- and NVH.</p> <p>25 Q. Okay. But it -- but at a minimum, it</p>	<p style="text-align: right;">Page 101</p> <p>1 S. Becker</p> <p>2 would include those three parameters that are</p> <p>3 listed here as A, B, and C?</p> <p>4 A. Sure.</p> <p>5 Q. Okay. Let's specifically look at</p> <p>6 some of these operational properties that are</p> <p>7 listed in figure 3.</p> <p>8 Can you describe for me -- depending</p> <p>9 on, let's say, the desired vehicle operational</p> <p>10 property for -- let's take handling, you know,</p> <p>11 how would that impact the driveline design?</p> <p>12 MS. MANDRUSIAK: Objection, form.</p> <p>13 A. With three features. One, the weight</p> <p>14 of the driveline system is going to affect</p> <p>15 handling. Two, the power distribution to the</p> <p>16 wheels. You know, front-wheel drive car is</p> <p>17 going to be a different configuration than a</p> <p>18 rear-wheel drive car. You have understeer,</p> <p>19 oversteer.</p> <p>20 Again, you have that torque vectoring</p> <p>21 to pull yourself around. You have yaw</p> <p>22 correction. In other words, we can eliminate</p> <p>23 skids by basing our analysis on your input and</p> <p>24 steering control to the available speed and</p> <p>25 traction -- tractive effort of the wheel.</p>

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<p>1 S. Becker</p> <p>2 Is there anything else? Oh, yeah.</p> <p>3 And again, biasing to affect steering.</p> <p>4 Q. So these are all --</p> <p>5 A. -- and efficiency. Sorry, last one.</p> <p>6 Q. So if you're looking to design a car</p> <p>7 that has, let's say, superior handling</p> <p>8 capabilities, the list of kind of kind of</p> <p>9 functions that you just described are all</p> <p>10 relevant analyses to then design a driveline</p> <p>11 system that has superior handling.</p> <p>12 Is that -- is that correct?</p> <p>13 Is that a correct characterization of</p> <p>14 your testimony?</p> <p>15 A. It's --</p> <p>16 MS. MANDRUSIAK: Objection, form.</p> <p>17 A. It's a partial characterization. You</p> <p>18 know, the steering -- the handling of the</p> <p>19 vehicle is first and foremost going to be</p> <p>20 affected by your steering control scheme. So</p> <p>21 the tractive effort -- the tractive -- the</p> <p>22 tractionability at the wheel and your steering</p> <p>23 ratio, steering column response are -- are</p> <p>24 going to be your primary players, and then your</p> <p>25 driveline's going to be a feature to augment</p>	<p>1 S. Becker</p> <p>2 that.</p> <p>3 Q. Okay. So -- so for the next line of</p> <p>4 questioning, I guess I'm going to focus on how</p> <p>5 various of these vehicle operational properties</p> <p>6 that are listed in figure 3, how they impact</p> <p>7 driveline design. So that's sort of the</p> <p>8 umbrella kind of framework for this line of --</p> <p>9 these next set of questions.</p> <p>10 So with respect to turnability, if</p> <p>11 that's an important kind of characteristic for</p> <p>12 a vehicle, how would that impact the design of</p> <p>13 the driveline system?</p> <p>14 A. Well, it's an important</p> <p>15 characteristic for every vehicle. The effects</p> <p>16 of the driveline system on turnability's a</p> <p>17 better characterization in that if you've got</p> <p>18 a -- a locked system, you're going to reduce</p> <p>19 your turnability. If you have clutches that</p> <p>20 are partially engaging, you can affect or</p> <p>21 improve steerability, turnability.</p> <p>22 So the driveline system interacts and</p> <p>23 affects turnability, but you want good</p> <p>24 turnability in all vehicles, and that's going</p> <p>25 to be defined by your steering characteristics,</p>
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<p>1 S. Becker</p> <p>2 so your upfront geometry.</p> <p>3 Q. Are there certain hardware and/or</p> <p>4 software capability of a driveline system that</p> <p>5 impacts turnability?</p> <p>6 A. Definitely.</p> <p>7 Q. And what are those?</p> <p>8 A. Again, that goes back to if you have</p> <p>9 a locking axle, locking differential, locking</p> <p>10 four-wheel drive system, or all-wheel drive</p> <p>11 system, or torque apply on various clutches.</p> <p>12 Q. Is there a difference in terms of the</p> <p>13 capability of a driveline system with a</p> <p>14 differential versus clutches?</p> <p>15 A. It depends where the clutches are</p> <p>16 applied.</p> <p>17 Q. So in the context of turnability, is</p> <p>18 there an advantage to one type of driveline</p> <p>19 architecture versus another?</p> <p>20 A. Definitely, yeah.</p> <p>21 Q. And -- and --</p> <p>22 A. Overall driveline architecture,</p> <p>23 definitely.</p> <p>24 Q. And so is there a preferred</p> <p>25 architecture for purposes of turnability?</p>	<p>1 S. Becker</p> <p>2 A. Well, generally, the more open the</p> <p>3 system is, in other words, the less resistive,</p> <p>4 the better the turnability will be.</p> <p>5 Q. Less resistive to what?</p> <p>6 A. Differentiation, which can be caused</p> <p>7 by having a differential, a disconnected axle,</p> <p>8 or a clutch pack system. All of them affect it</p> <p>9 in some fashion or another differently, you</p> <p>10 know, not including steering geometry.</p> <p>11 Q. So of the three sort of architectures</p> <p>12 you described, which has the least amount of</p> <p>13 differentiation?</p> <p>14 A. Least amount?</p> <p>15 Q. A differential, a disconnected axle,</p> <p>16 or a clutch pack system?</p> <p>17 MS. MANDRUSIAK: Objection, form.</p> <p>18 A. That's going to depend on the design</p> <p>19 of each one of those systems. Generally, the</p> <p>20 disconnected axle and independent --</p> <p>21 independent wheels is going to have the least</p> <p>22 effect on turnability, but the most effect</p> <p>23 depends on the design.</p> <p>24 Q. So then within kind of the broader</p> <p>25 framework of understanding the vehicle</p>

<p style="text-align: right;">Page 106</p> <p>1 S. Becker</p> <p>2 operational parameters, you would also have to</p> <p>3 look at the specifics of the hardware and how</p> <p>4 that impacts, in this case, let's say</p> <p>5 turnability?</p> <p>6 A. Yes, yeah. Any hardware you put in</p> <p>7 the vehicle you'd have to develop for that</p> <p>8 vehicle whether you choose to use a mechanical</p> <p>9 diff, clutch diff, open diff, a locked diff.</p> <p>10 Q. And, I'm sorry, when you're referring</p> <p>11 to "diff," you're referring to differential?</p> <p>12 A. Yes, sorry.</p> <p>13 Q. That's just for the record.</p> <p>14 And so would every change then to</p> <p>15 the -- all these different kinds of -- well,</p> <p>16 let's just focus on differentials.</p> <p>17 You mentioned I think four different</p> <p>18 kinds of differentials: A mechanical</p> <p>19 differential, a clutch differential, open</p> <p>20 differential, and a locked differential.</p> <p>21 Would changes -- would moving from</p> <p>22 one of those differentials to the other</p> <p>23 differential have an impact then with respect</p> <p>24 to the resultant turnability that the vehicle</p> <p>25 can achieve?</p>	<p style="text-align: right;">Page 107</p> <p>1 S. Becker</p> <p>2 MS. MANDRUSIAK: Objection, form.</p> <p>3 A. No, that would have to be developed.</p> <p>4 You could interchange a variety of those all</p> <p>5 except for the locked differential. Once you</p> <p>6 lock the differential, you're -- you're going</p> <p>7 to affect the turnability.</p> <p>8 BY MS. SHAH:</p> <p>9 Q. What's involved with interchanging</p> <p>10 those differential components?</p> <p>11 A. Well, it goes back to the design</p> <p>12 development -- development, verification and</p> <p>13 predictability and reliability planning. So</p> <p>14 you -- you'd go through your full DVP&amp;R</p> <p>15 process.</p> <p>16 Q. I'm sorry, there's an acronym you</p> <p>17 used. What does that stand for?</p> <p>18 A. DVP&amp;R? Design, validation --</p> <p>19 development, validation, predictability, and</p> <p>20 reliability, what I'd said just before that.</p> <p>21 Q. And so for every architecture change</p> <p>22 that's proposed, you would go through this --</p> <p>23 what you refer to as DVP&amp;R process?</p> <p>24 A. Exactly.</p> <p>25 Q. Is that correct?</p>
<p style="text-align: right;">Page 108</p> <p>1 S. Becker</p> <p>2 So for an iterative process, which is</p> <p>3 for -- as far as I understand, what you</p> <p>4 mentioned was driveline designs are iterative</p> <p>5 that -- so for every iteration of a component</p> <p>6 change, there would be -- you would -- a</p> <p>7 designer would essentially go through this</p> <p>8 DVP&amp;R process?</p> <p>9 A. Yes.</p> <p>10 MS. MANDRUSIAK: Objection, form.</p> <p>11 A. And other processes, but yes.</p> <p>12 BY MS. SHAH:</p> <p>13 Q. And what other processes would be</p> <p>14 involved?</p> <p>15 A. In the DVP&amp;R process, that's just</p> <p>16 your development plan for predictability and</p> <p>17 reliability. You would also have -- oh, what</p> <p>18 the hell's it called? It's kind of the fault</p> <p>19 tree for what's going to break. I forgot what</p> <p>20 it's called right now, but it's basically a</p> <p>21 durability plan.</p> <p>22 Q. Okay. All right, so then again</p> <p>23 continuing on, looking on figure 3 of page 2 of</p> <p>24 Exhibit 2, if we were to consider tractive and</p> <p>25 velocity capability, do you see where that's</p>	<p style="text-align: right;">Page 109</p> <p>1 S. Becker</p> <p>2 listed here?</p> <p>3 A. Yes.</p> <p>4 Q. You see in operational parameter?</p> <p>5 How would that operational parameter impact</p> <p>6 driveline design?</p> <p>7 A. Well, there's three parameters in</p> <p>8 that box, tractive -- my copy stinks. Velocity</p> <p>9 and fuel. And those are kind of three</p> <p>10 different things. So, you know, each one would</p> <p>11 need to be addressed.</p> <p>12 Q. Okay.</p> <p>13 A. In general, like let's just say we</p> <p>14 change out a differential. You're going to</p> <p>15 have to look at the change to the fuel economy.</p> <p>16 Q. All right.</p> <p>17 A. You change out a differential, it's</p> <p>18 going to change your tractive effort and how</p> <p>19 each wheel on that axle system is going to</p> <p>20 respond.</p> <p>21 Q. And what is done then to understand</p> <p>22 the impact on fuel economy when you make that</p> <p>23 sort of change, that component change?</p> <p>24 A. Well, first we're going to model the</p> <p>25 system.</p>

<p style="text-align: right;">Page 110</p> <p>1 S. Becker</p> <p>2 Q. Okay.</p> <p>3 A. And we're going to model the drag</p> <p>4 caused by the system. And then we're going to</p> <p>5 model a vehicle through various maneuvers,</p> <p>6 typical maneuvers for whatever that product is.</p> <p>7 And they'll develop an estimate fuel economy</p> <p>8 because they know what the losses are.</p> <p>9 Q. Yes.</p> <p>10 A. Eventually, parts would be made and</p> <p>11 you would verify that and validate it, then you</p> <p>12 would productionize it.</p> <p>13 Q. And so as you're going through</p> <p>14 different iterations, you -- for each iteration</p> <p>15 you would then model the -- how the vehicle</p> <p>16 functions relative to fuel economy losses?</p> <p>17 A. Yeah. Generally, they would do that</p> <p>18 upfront in the -- the early concept phase. You</p> <p>19 know, we wouldn't typically take some brand new</p> <p>20 technology in the middle of a full-on</p> <p>21 development program after we've already decided</p> <p>22 on the concept, made prototypes, and then we</p> <p>23 wouldn't just swap in something new. That</p> <p>24 would be locked until the -- the vehicle's</p> <p>25 validated.</p>	<p style="text-align: right;">Page 111</p> <p>1 S. Becker</p> <p>2 So then if some new technology or</p> <p>3 change in technology was intended to be</p> <p>4 applied, it would either be a problem-solving</p> <p>5 technique with the problem being cost, weight,</p> <p>6 performance, or some other problem. Then that</p> <p>7 would become part of that product. Or it would</p> <p>8 be a change implemented in some new release of</p> <p>9 that product.</p> <p>10 So in other words, like a model year</p> <p>11 refresh or something like that. So it would be</p> <p>12 part of the overall systems.</p> <p>13 And then what they do is any CN, any</p> <p>14 change notice, they'll try to group as many of</p> <p>15 those together so that everything's getting</p> <p>16 validated at once.</p> <p>17 Q. And then turning to the next --</p> <p>18 there's another box in figure 3 again of page 2</p> <p>19 of Exhibit 2, and that just refers to off-road</p> <p>20 mobility.</p> <p>21 Could you explain how off-road</p> <p>22 mobility impacts driveline systems and their</p> <p>23 design?</p> <p>24 A. Sure. That one's heavily tied to the</p> <p>25 suspension as well. And off-road mobility is</p>
<p style="text-align: right;">Page 112</p> <p>1 S. Becker</p> <p>2 again kind of tied to tractive and velocity.</p> <p>3 In other words, how much slip are you going to</p> <p>4 allow, how much distribution of torque are you</p> <p>5 going to apply, and then how are you going to</p> <p>6 interact with the weight shift of the vehicle</p> <p>7 and torque shift at the same time. And a lot</p> <p>8 of that goes back to the marketing of the</p> <p>9 vehicle.</p> <p>10 Again, you know, like a Jeep brand</p> <p>11 vehicle's not going to have the same off-road</p> <p>12 characteristics as a Chrysler, or a Chevy's not</p> <p>13 going to have the same off-road characteristics</p> <p>14 as a GMC.</p> <p>15 Q. What about a dune buggy as compared</p> <p>16 to a passenger vehicle?</p> <p>17 A. Sure. The dune buggies, we -- we</p> <p>18 don't typically employ the all-wheel drive</p> <p>19 systems except for the very high-end dune</p> <p>20 buggies. They're -- they're more frequently</p> <p>21 looking for only off-road capability. You</p> <p>22 know, there's no on-road capability so it's</p> <p>23 all -- all tractive reduction. You're trying</p> <p>24 to lose any -- any type of a slip.</p> <p>25 Q. So would there be substantial</p>	<p style="text-align: right;">Page 113</p> <p>1 S. Becker</p> <p>2 differences between the driveline system then</p> <p>3 for -- again, let's say take a dune buggy</p> <p>4 versus a passenger vehicle?</p> <p>5 A. Definitely.</p> <p>6 Q. And what are those?</p> <p>7 What kind of differences would be</p> <p>8 would one be able to identify?</p> <p>9 A. On the dune buggy, you're going to be</p> <p>10 more focused on locked systems. And not</p> <p>11 necessarily. You know, it could be a sand dune</p> <p>12 buggy where you want to allow a little bit of</p> <p>13 slip. A passenger vehicle's not going to be as</p> <p>14 concerned with locking vehicle, locking axles</p> <p>15 and things of that nature for tractive effort</p> <p>16 if the dune buggy's all-wheel drive. Sorry.</p> <p>17 Q. Is that typically the case?</p> <p>18 Are there -- are there all-wheel</p> <p>19 drive -- I guess is there a demand for</p> <p>20 all-wheel drive buggies, off-road buggies like</p> <p>21 that?</p> <p>22 A. Yeah, that's generally in the higher</p> <p>23 end or -- actually, not necessarily the higher</p> <p>24 end. The high end is just really all about</p> <p>25 power. But, like, my old dune buggy was</p>

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<p>1 S. Becker</p> <p>2 two-wheel drive, wasn't all-wheel drive or</p> <p>3 anything, and it could go through anything,</p> <p>4 just slowly.</p> <p>5 So the higher end ones were really</p> <p>6 more power and more speed. The all-wheel drive</p> <p>7 comes in, adds a form of complexity, and you'll</p> <p>8 see them on the -- the mid high-range ones as</p> <p>9 well as the very high end ones. You don't see</p> <p>10 them on the cheap ones.</p> <p>11 Q. So how would the -- specifically in</p> <p>12 terms of components and the design of the</p> <p>13 components, how would -- in these kinds of</p> <p>14 off-road vehicles, how do the drivelines differ</p> <p>15 from -- from that system, for off -- that</p> <p>16 off-road vehicle as compared to a vehicle</p> <p>17 that's more designed for on-the-road</p> <p>18 applications?</p> <p>19 A. You're going to --</p> <p>20 MS. MANDRUSIAK: Objection, form.</p> <p>21 A. You're going to generally see bigger</p> <p>22 components or, if the vehicle's lightweight,</p> <p>23 smaller components, you know, so it really</p> <p>24 depends on the specific application.</p> <p>25 Like, if I take a high-performance</p>	<p>1 S. Becker</p> <p>2 on-road all-wheel drive sports car compared to</p> <p>3 a high-performance off-road vehicle, you're not</p> <p>4 going to see drastic differences in</p> <p>5 componentry. You're going to see control</p> <p>6 schema differences.</p> <p>7 And you're going to see in the</p> <p>8 off-road vehicle greater -- or different other</p> <p>9 things, like ground clearance and wheel size</p> <p>10 and etc.</p> <p>11 So again, it -- it depends on the --</p> <p>12 the specifics of what you're comparing because,</p> <p>13 you know, it -- it's a market basket. You can</p> <p>14 go to the market and make your dune buggy or</p> <p>15 off-road vehicle into whatever you want to,</p> <p>16 same thing you can with the car. It just</p> <p>17 depends on your -- your cost target point and</p> <p>18 your performance characteristics.</p> <p>19 Q. So can you pretty much mix and match?</p> <p>20 Can -- whatever set of components and controls</p> <p>21 you want?</p> <p>22 A. Not exactly. You -- you would like</p> <p>23 to. You can mix and match just about any</p> <p>24 component but I can't take like, you know,</p> <p>25 Honda's best design, match it up with a GM</p>
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<p>1 S. Becker</p> <p>2 engine in an -- in an Audi suspension or</p> <p>3 something like that. They won't fit. They</p> <p>4 won't function together.</p> <p>5 I had a friend in a different</p> <p>6 industry ask me that same question. It's like,</p> <p>7 why can't you just take the best parts of each</p> <p>8 vehicle and put them together?</p> <p>9 Well, they don't work because there's</p> <p>10 a huge amount of vehicle synthesis generally</p> <p>11 done.</p> <p>12 So on any given vehicle design, you</p> <p>13 incorporate the parts for that vehicle. You</p> <p>14 have a market basket to choose from when you're</p> <p>15 initially putting together the vehicle so</p> <p>16 concepts, any concepts you -- you want to apply</p> <p>17 to that vehicle, you can.</p> <p>18 Like Formula 1 uses some of the</p> <p>19 latest technology. As you would expect, those</p> <p>20 are very high, expensive vehicles. They're</p> <p>21 going to use the high, expensive technology.</p> <p>22 Q. What -- if you -- you know, when</p> <p>23 you're kind of selecting from this basket that</p> <p>24 you referred to of available components and</p> <p>25 technologies, is it a complicated process to</p>	<p>1 S. Becker</p> <p>2 try to, you know, kind of then fit these</p> <p>3 various technologies and components together?</p> <p>4 MS. MANDRUSIAK: Objection, form.</p> <p>5 A. I think it depends on how well you</p> <p>6 define your vehicle. A -- a well-defined</p> <p>7 vehicle, objective on targets, pretty much</p> <p>8 shows you your path of what components you're</p> <p>9 going to want for that vehicle.</p> <p>10 A loosely designed -- defined</p> <p>11 vehicle, you're going to try greater numbers of</p> <p>12 iterations. So it -- you know, it depends on</p> <p>13 how well you lay out what you want.</p> <p>14 BY MS. SHAH:</p> <p>15 Q. But essentially, it's possible to,</p> <p>16 with a reasonable amount of effort, to mix and</p> <p>17 match a variety of different kinds of</p> <p>18 components and control strategies?</p> <p>19 A. Exactly.</p> <p>20 Q. Are there any constraints that exist?</p> <p>21 A. Definitely, yeah. You -- again,</p> <p>22 you're talking about cost and weight and</p> <p>23 complexity of integration.</p> <p>24 If you just use a front-wheel drive</p> <p>25 vehicle, you know, you got no all-wheel drive</p>

<p style="text-align: right;">Page 118</p> <p>1 S. Becker</p> <p>2 systems to concern yourself, with there's lower</p> <p>3 complexity, lower weight, lower cost.</p> <p>4 You put all-wheel drive on the</p> <p>5 vehicle, you now have to connect the two axles</p> <p>6 together and then you have to decide how you</p> <p>7 want it to work. So then you increased your</p> <p>8 development complexity. So then let's say you</p> <p>9 want to use, you know, like an existing product</p> <p>10 like an open differential that you employed</p> <p>11 before. Then that's just a matter of</p> <p>12 packaging, fit and function and integrating it</p> <p>13 to the system, which is going to happen</p> <p>14 anyways.</p> <p>15 So then let's incorporate, you know,</p> <p>16 additional control schemes where we're going to</p> <p>17 start tagging each one of the sensors and</p> <p>18 applying torque vectoring or whatnot. You got</p> <p>19 to make sure that all works so you're going to</p> <p>20 have greater development costs.</p> <p>21 Q. So the -- the connection of different</p> <p>22 components and different control systems that</p> <p>23 are potentially available to define a</p> <p>24 particular driveline system, they're well known</p> <p>25 and largely routine, in your opinion?</p>	<p style="text-align: right;">Page 119</p> <p>1 S. Becker</p> <p>2 A. They're always coming up with new</p> <p>3 control systems. The whole mechatronic concept</p> <p>4 to driveline is less than -- is about 20 years</p> <p>5 old.</p> <p>6 Q. Okay.</p> <p>7 A. Before that, they were almost all</p> <p>8 mechanical.</p> <p>9 Q. So let's say over the last decade if</p> <p>10 you -- if you -- you know, if you got sort of</p> <p>11 an array of components that are available and</p> <p>12 array of, let's say, control strategies, is it</p> <p>13 possible then to effectively somewhat routinely</p> <p>14 mix and match those components and control</p> <p>15 strategies to achieve, I guess, whatever end</p> <p>16 vehicle characteristics you're looking for?</p> <p>17 A. Initial concept and cost no object,</p> <p>18 sure.</p> <p>19 Q. Are there any functional constraints</p> <p>20 that would exist that would limit your ability</p> <p>21 to mix and match components and control</p> <p>22 strategies?</p> <p>23 A. Well, again, cost is a functional</p> <p>24 constraint. Weight's a functional constraint.</p> <p>25 NVH is -- you know, the performance</p>
<p style="text-align: right;">Page 120</p> <p>1 S. Becker</p> <p>2 characteristics, they're all functional</p> <p>3 constraints. So each thing you put in the</p> <p>4 vehicle needs to be developed.</p> <p>5 Q. Let me ask more specifically. Are</p> <p>6 there specific component characteristics in</p> <p>7 their functionality that limit their ability to</p> <p>8 work with other components and/or control</p> <p>9 strategies?</p> <p>10 A. I would have to think about it. I --</p> <p>11 you know, I'd have to -- if -- if you gave me a</p> <p>12 specific example, I -- I -- I could review</p> <p>13 that, but I'm not coming up with one</p> <p>14 specifically. Doesn't mean they don't exist.</p> <p>15 It's a very broad hypothetical.</p> <p>16 MS. SHAH: Off the record?</p> <p>17 (Discussion held off the record.)</p> <p>18 (Becker Exhibit No. 3 was marked for</p> <p>19 identification.)</p> <p>20 BY MS. SHAH:</p> <p>21 Q. If you could identify for me what's</p> <p>22 been marked as Exhibit 3, please.</p> <p>23 A. Yeah, this is the -- the GKN, what I</p> <p>24 call the '440 patent.</p> <p>25 Q. Have you reviewed this patent before</p>	<p style="text-align: right;">Page 121</p> <p>1 S. Becker</p> <p>2 today?</p> <p>3 A. Definitely.</p> <p>4 Q. How would you characterize the nature</p> <p>5 of your review?</p> <p>6 MS. MANDRUSIAK: Objection, form.</p> <p>7 A. I don't know that I would. It was an</p> <p>8 investigation.</p> <p>9 BY MS. SHAH:</p> <p>10 Q. Have you read every page of this</p> <p>11 patent?</p> <p>12 A. I believe so. Yeah, some pages</p> <p>13 didn't have words.</p> <p>14 Q. So turning to the back of the patent,</p> <p>15 the last two pages of the patent, there's a</p> <p>16 section that refers to -- that sort of</p> <p>17 starts -- starts off with the heading "The</p> <p>18 invention claimed is" under column 12 of the</p> <p>19 second-to-last page of Exhibit 3.</p> <p>20 Do you see that?</p> <p>21 A. Correct.</p> <p>22 Q. Do you understand that those are</p> <p>23 claims of the patent?</p> <p>24 A. Exactly.</p> <p>25 Q. And what's your understanding of --</p>

<p style="text-align: right;">Page 122</p> <p>1 S. Becker</p> <p>2 of the purpose of these claims?</p> <p>3 MS. MANDRUSIAK: Objection, form,</p> <p>4 foundation.</p> <p>5 A. I believe these claims are -- the</p> <p>6 objective of this is what the patent claims to</p> <p>7 be patentable or unique.</p> <p>8 BY MS. SHAH:</p> <p>9 Q. Are you reasonably comfortable with</p> <p>10 the -- the -- the language that's articulated</p> <p>11 in these claims and understanding what they</p> <p>12 mean?</p> <p>13 MS. MANDRUSIAK: Objection, form.</p> <p>14 A. I had to figure them out. They</p> <p>15 weren't the industry standard language, but I</p> <p>16 understand them.</p> <p>17 BY MS. SHAH:</p> <p>18 Q. So is the -- is the first time that</p> <p>19 you looked at patent claims was the first</p> <p>20 engagement you had as a patent expert or as a</p> <p>21 technical expert for a patent matter?</p> <p>22 A. I don't know what you mean.</p> <p>23 Q. You indicated earlier that you were</p> <p>24 retained by a different company for a patent</p> <p>25 matter.</p>	<p style="text-align: right;">Page 123</p> <p>1 S. Becker</p> <p>2 Was there a patent involved in that</p> <p>3 patent matter?</p> <p>4 A. Definitely.</p> <p>5 Q. And did you look at claims there to</p> <p>6 understand what the scope of those claims were?</p> <p>7 A. Yes.</p> <p>8 Q. Was that the first time that you</p> <p>9 looked at a set of patent claims?</p> <p>10 A. No.</p> <p>11 Q. So when you look -- when you look at</p> <p>12 a set of claims, what -- what process do you</p> <p>13 undertake to understand the scope of those</p> <p>14 claims?</p> <p>15 A. Well, there's a -- a terminology used</p> <p>16 in the claims, and they're usually described</p> <p>17 throughout the patent. And then there's</p> <p>18 letters and numbers associated -- or figures</p> <p>19 and numbers associated to the components</p> <p>20 described in the claims. And it's kind of an</p> <p>21 investigation to figure out, you know, what --</p> <p>22 what everybody's talking about.</p> <p>23 Q. Okay. So from your evaluation of the</p> <p>24 '440 patent, what was your understanding of</p> <p>25 kind of the objectives of the patent?</p>
<p style="text-align: right;">Page 124</p> <p>1 S. Becker</p> <p>2 A. The overall goals?</p> <p>3 Q. Yes.</p> <p>4 A. They were describing sort of having a</p> <p>5 shutdown section where a section of the</p> <p>6 driveline was not spinning for fuel efficiency.</p> <p>7 There -- if I can look at my declaration, I've</p> <p>8 got them outlined there easily; otherwise, it's</p> <p>9 going to take a few seconds.</p> <p>10 (Becker Exhibit No. 4 was marked for</p> <p>11 identification.)</p> <p>12 BY MS. SHAH:</p> <p>13 Q. So if I could quickly ask you one</p> <p>14 question not related to the declaration, you</p> <p>15 mentioned when I was asking you about reviewing</p> <p>16 patent claims that you did review patent claims</p> <p>17 prior to your engagement as a patent expert for</p> <p>18 I think it was ARB or -- or something like</p> <p>19 that.</p> <p>20 In what capacity did you -- or what</p> <p>21 was the purpose of your review of patent claims</p> <p>22 prior to that?</p> <p>23 A. One was for the truck brush.</p> <p>24 Q. Okay.</p> <p>25 A. And the other -- not the other, but</p>	<p style="text-align: right;">Page 125</p> <p>1 S. Becker</p> <p>2 others were as an employee of Magna or New</p> <p>3 Venture Gear, New Process Gear. We have 50 or</p> <p>4 so patents.</p> <p>5 Q. Okay. So you were reviewing the</p> <p>6 patents for what purpose then?</p> <p>7 A. They were our products. It was just</p> <p>8 internal company work.</p> <p>9 Q. I see.</p> <p>10 A. I wasn't on the patents.</p> <p>11 Q. Yes.</p> <p>12 So were they from a competitive</p> <p>13 standpoint to sort of do some benchmarking, or</p> <p>14 were they to actually look at your own -- to</p> <p>15 understand your own patent portfolio?</p> <p>16 A. I was looking mostly at our own</p> <p>17 patents at that time. We had other people</p> <p>18 looking at competitive patents, not me.</p> <p>19 Q. And had -- at that time, had you had</p> <p>20 any meetings or discussion with patent</p> <p>21 attorneys to understand kind of how one</p> <p>22 interprets a patent, and specifically, patent</p> <p>23 claims?</p> <p>24 A. Yeah, Phil Riddick (ph) was the</p> <p>25 attorney for our company.</p>



<p style="text-align: right;">Page 126</p> <p>1 S. Becker</p> <p>2 Q. Okay. He was an internal attorney</p> <p>3 with -- employed by, I guess, Magna?</p> <p>4 A. I have no idea. He was the guy I was</p> <p>5 told to call.</p> <p>6 Q. I see. All right.</p> <p>7 And did you get a tutorial of how one</p> <p>8 reads a patent, and specifically, patent</p> <p>9 claims?</p> <p>10 A. Not specifically, not like a</p> <p>11 tutorial. That's an interesting thought.</p> <p>12 Q. Have you ever received a tutorial of</p> <p>13 how patent claims are to be interpreted?</p> <p>14 A. No.</p> <p>15 Q. So including up to date, you have not</p> <p>16 received a tutorial of how a patent claim is to</p> <p>17 be construed?</p> <p>18 A. Construed? Well --</p> <p>19 Q. Interpreted.</p> <p>20 A. -- construed is -- "interpret" means</p> <p>21 you review the patent. You know, I don't know</p> <p>22 that you need a tutorial to read.</p> <p>23 Q. Okay. So let's turn to Exhibit 4,</p> <p>24 your -- which is your declaration.</p> <p>25 A. Sure.</p>	<p style="text-align: right;">Page 127</p> <p>1 S. Becker</p> <p>2 Q. Declaration of Steven J. Becker. Do</p> <p>3 you see that?</p> <p>4 A. Correct.</p> <p>5 Q. And I believe you wanted to review</p> <p>6 this to answer an earlier question. Okay, and</p> <p>7 this was the issue of -- so the -- the question</p> <p>8 was: What was your understanding of the</p> <p>9 objectives of the patents, of the '440 patents?</p> <p>10 And then you specifically mentioned</p> <p>11 the shutdown section.</p> <p>12 A. Correct.</p> <p>13 Q. And you wanted to take a look at --</p> <p>14 it's based on your answer, it seemed like you</p> <p>15 wanted to take a look at your declaration to</p> <p>16 understand something about the shutdown</p> <p>17 section.</p> <p>18 A. No, not about the shutdown section.</p> <p>19 You had asked me to identify what the -- what I</p> <p>20 determined to be the claims of the patent.</p> <p>21 Q. Okay.</p> <p>22 A. I have them outlined in a table so it</p> <p>23 makes them easier for me to read.</p> <p>24 Q. All right. Did -- so did you prepare</p> <p>25 this table that's, let's say -- let's start</p>
<p style="text-align: right;">Page 128</p> <p>1 S. Becker</p> <p>2 with the table that is -- that begins on page</p> <p>3 18.</p> <p>4 A. Yes.</p> <p>5 Q. Did you prepare the table that's on</p> <p>6 pages 18 and continues on through pages 22?</p> <p>7 A. Yes, it's part of the declaration.</p> <p>8 It goes on further.</p> <p>9 Q. Okay. And so can you explain to me</p> <p>10 the -- your understanding of the shutdown</p> <p>11 section and its purpose?</p> <p>12 A. My understanding of the shutdown</p> <p>13 section and its purpose. The shutdown section</p> <p>14 was a decoupling of the RDM and the decoupling</p> <p>15 of the front driveline so that a portion of the</p> <p>16 driveline's not spinning for the purpose of</p> <p>17 fuel efficiency, primarily.</p> <p>18 You would also see some benefits to</p> <p>19 NVH, potentially, noise and vibration. Yeah,</p> <p>20 that's probably the only two reasons I would</p> <p>21 shutdown the section.</p> <p>22 Q. Are there architecture features that</p> <p>23 are important to include to help facilitate a</p> <p>24 shutdown section?</p> <p>25 A. Yes. You have to have a connected</p>	<p style="text-align: right;">Page 129</p> <p>1 S. Becker</p> <p>2 front axle, rear axle. You would have to have</p> <p>3 a disconnect or a coupling feature. That's it.</p> <p>4 Yeah, the patent calls it the primary</p> <p>5 drivetrain and the secondary drivetrain. Those</p> <p>6 are the two things that need to be connected.</p> <p>7 Q. Are there any other purposes or goals</p> <p>8 of the '440 patent?</p> <p>9 THE REPORTER: The last word? I</p> <p>10 didn't hear it.</p> <p>11 MS. SHAH: Patents. Goals. Goals</p> <p>12 of the '440 patents.</p> <p>13 THE REPORTER: Thank you.</p> <p>14 A. Yeah, they mention they're doing a</p> <p>15 frictionally engaged coupling.</p> <p>16 BY MS. SHAH:</p> <p>17 Q. So how does that represent to a focus</p> <p>18 or objective of the patent?</p> <p>19 A. That's one of the --</p> <p>20 MS. MANDRUSIAK: Objection, form.</p> <p>21 A. That's one of the claims, so one of</p> <p>22 the claims is that they do this with a</p> <p>23 frictionally engaged coupling, that decoupling</p> <p>24 process. So they -- they describe in part how</p> <p>25 they're doing that decoupling. There's more,</p>

<p style="text-align: right;">Page 130</p> <p>1 S. Becker</p> <p>2 though.</p> <p>3 BY MS. SHAH:</p> <p>4 Q. What else? What other features or</p> <p>5 aspects are -- okay, strike that.</p> <p>6 What other goals or objectives do you</p> <p>7 think were trying to be met by the '440 patent?</p> <p>8 MS. MANDRUSIAK: Objection, form,</p> <p>9 foundation.</p> <p>10 A. There's another claim that they were</p> <p>11 achieving power distribution without</p> <p>12 differential gearing in the secondary axle.</p> <p>13 BY MS. SHAH:</p> <p>14 Q. How is that achieved?</p> <p>15 A. Frictional couplings according to the</p> <p>16 diagrams and -- and description, and --</p> <p>17 Q. Is there a specific figure that sort</p> <p>18 of you could point to that illustrates that</p> <p>19 architecture?</p> <p>20 A. Yes. Figure 3 shows that</p> <p>21 architecture in the '440 patent, and figure 5</p> <p>22 and 6, and figure 8 and I think 10. I'd have</p> <p>23 to look in more detail, but possibly 12. And</p> <p>24 then that's it.</p> <p>25 Q. So you mentioned that one of the</p>	<p style="text-align: right;">Page 131</p> <p>1 S. Becker</p> <p>2 objectives of the '440 patent was to have a</p> <p>3 shutdown section. You also mentioned that one</p> <p>4 of the objectives of the '440 patent is to</p> <p>5 include frictional couplings without</p> <p>6 differential gearing. Is that correct?</p> <p>7 A. Well, there were two separate things.</p> <p>8 One was to have frictional couplings and one is</p> <p>9 to have frictional couplings in place of the</p> <p>10 differential gearing.</p> <p>11 Q. Do those two objectives -- are those</p> <p>12 two objectives combined at any point in time,</p> <p>13 or are they distinct?</p> <p>14 MS. MANDRUSIAK: Objection, form.</p> <p>15 A. They can be combined.</p> <p>16 BY MS. SHAH:</p> <p>17 Q. Is there an embodiment or a figure</p> <p>18 that shows the combination of those objectives?</p> <p>19 A. The ones I just mentioned,</p> <p>20 specifically, again, figure 8, figure 13, 5,</p> <p>21 and 6.</p> <p>22 Q. And so in the figures that you just</p> <p>23 mentioned, the -- the figure illustrates a</p> <p>24 driveline design that both includes a shutdown</p> <p>25 section as well as a two-clutch system that</p>
<p style="text-align: right;">Page 132</p> <p>1 S. Becker</p> <p>2 does not have differential gearing; is that</p> <p>3 correct?</p> <p>4 A. No, only figure 3 shows all of that.</p> <p>5 Q. But it is in figure 3?</p> <p>6 A. What's that?</p> <p>7 Q. It would be in figure 3, the</p> <p>8 system --</p> <p>9 A. It's in --</p> <p>10 Q. -- that I just described?</p> <p>11 A. -- figure 3. And I think the</p> <p>12 schematics in some of the other figures.</p> <p>13 Q. So to achieve a system as -- such as</p> <p>14 the one shown in figure 3 that has a shutdown</p> <p>15 section coupled with a two-clutch architecture</p> <p>16 without differential gearing, what is required</p> <p>17 to design this kind of a system?</p> <p>18 MS. MANDRUSIAK: Objection, form.</p> <p>19 A. You need a PTU disconnect or transfer</p> <p>20 case or switch on mechanism on the primary axle</p> <p>21 that's disconnectable from the prop shaft,</p> <p>22 from -- from the front axle shaft.</p> <p>23 And then you need to be capable of</p> <p>24 disconnecting the side shaft couplings, as they</p> <p>25 call them, or the half shafts in the rear axle.</p>	<p style="text-align: right;">Page 133</p> <p>1 S. Becker</p> <p>2 And then you would have to have two frictional</p> <p>3 clutch packs to replace the differential. Or</p> <p>4 one clutch pack could do the same.</p> <p>5 Q. How would one clutch pack, I guess,</p> <p>6 replace a -- a differential?</p> <p>7 A. If you slipped either side.</p> <p>8 Q. And are there any other modifications</p> <p>9 that would be required if you substitute a</p> <p>10 differential for one or more clutch packs?</p> <p>11 A. Did you ask for -- did you ask for</p> <p>12 other alternatives?</p> <p>13 Q. No, I'm just asking what's involved</p> <p>14 with making that change from a system with a</p> <p>15 differential with differential gearing, let's</p> <p>16 say, to one that eliminates the differential</p> <p>17 gearing and substitutes then either one clutch</p> <p>18 pack or two clutch packs.</p> <p>19 A. Sure. Again, that's the -- the --</p> <p>20 the same DVP&amp;R and durability planning you'd</p> <p>21 need to do. Packaging, net cost, and weight.</p> <p>22 Q. Do you understand that there's a sort</p> <p>23 of a relevant date associated with the '440</p> <p>24 patent?</p> <p>25 A. Of course.</p>

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<p>1 S. Becker</p> <p>2 Q. And when do you understand that date</p> <p>3 to be?</p> <p>4 A. Date of the patent, July 10, 2012.</p> <p>5 And then it was filed April 30, 2009.</p> <p>6 Q. Okay. Are you -- in your declaration</p> <p>7 you indicate there's a May 6, 2008 date that's</p> <p>8 also relevant. I can perhaps point you to an</p> <p>9 exact section.</p> <p>10 A. I see it on page 2.</p> <p>11 Q. Are you familiar with where that date</p> <p>12 came from?</p> <p>13 A. That may be related to the</p> <p>14 prosecution history document.</p> <p>15 Q. Okay.</p> <p>16 A. I don't have that in front of me.</p> <p>17 Q. Okay. For this purpose, let's just</p> <p>18 assume that the relevant time frame is May 6,</p> <p>19 2008 for purposes of the '440 patent.</p> <p>20 If you take that -- you know, looking</p> <p>21 back at that particular time period and the</p> <p>22 knowledge that existed on or before May 6,</p> <p>23 2008, was there a system that existed that</p> <p>24 included the combination of a shutdown section</p> <p>25 in conjunction with a clutch pack system</p>	<p>1 S. Becker</p> <p>2 without differential gearing?</p> <p>3 MS. MANDRUSIAK: Objection, form.</p> <p>4 A. I believe the question is, was there</p> <p>5 a differential without differential gearing?</p> <p>6 BY MS. SHAH:</p> <p>7 Q. No. Let me read back the --</p> <p>8 actually, do you want to go ahead and -- I can</p> <p>9 read it.</p> <p>10 A. Just somebody.</p> <p>11 Q. I'll just read it: "Was there a</p> <p>12 system that existed that included the</p> <p>13 combination of a shutdown section in</p> <p>14 conjunction with a clutch pack system without</p> <p>15 differential gearing?"</p> <p>16 MS. MANDRUSIAK: Objection, form.</p> <p>17 BY MS. SHAH:</p> <p>18 Q. As of this May -- on or before May 6,</p> <p>19 2008.</p> <p>20 A. Sure. Not all in one, correct.</p> <p>21 Q. And it's your testimony that the</p> <p>22 combination of a system that had a shutdown</p> <p>23 section coupled with a different system that</p> <p>24 had a clutch pack design would be obvious?</p> <p>25 A. Yes, yes.</p>
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<p>1 S. Becker</p> <p>2 Q. And why is that?</p> <p>3 A. Well, it's two separate features.</p> <p>4 One, you're shutting down a section with the</p> <p>5 intention of reducing fuel consumption. Two,</p> <p>6 you're providing differentiation with clutch</p> <p>7 packs for doing that. Those are kind of two</p> <p>8 different variables. They do both partially</p> <p>9 affect fuel efficiency and can be combined, but</p> <p>10 you can do one without the other.</p> <p>11 Q. So what would lead a person to</p> <p>12 combine them?</p> <p>13 A. They wanted to eliminate the</p> <p>14 differential gears.</p> <p>15 Q. And why would one want to do that?</p> <p>16 A. Control scheme is all I can imagine.</p> <p>17 The -- the main reason you would do that would</p> <p>18 be so that you could better distribute the</p> <p>19 torque between the two rear wheels, torque and</p> <p>20 speed.</p> <p>21 Q. And if you -- when you substitute</p> <p>22 a -- I'm sorry, when you go from a differential</p> <p>23 system to a clutch pack system, what's the</p> <p>24 impact on -- in terms of weight?</p> <p>25 A. Again, you're talking a geared system</p>	<p>1 S. Becker</p> <p>2 versus a clutch --</p> <p>3 Q. Right.</p> <p>4 A. -- differential, so they're both</p> <p>5 still differential systems. Again, that's</p> <p>6 going to be a -- a "depends" answer. It's</p> <p>7 claimed that that would reduce weight and</p> <p>8 complexity, but you're adding the mechatronics</p> <p>9 onto it as well so that would be a case-by-case</p> <p>10 analysis in the reality of it.</p> <p>11 Q. Prior to May 6, 2008 -- okay, I'm</p> <p>12 sorry. Let's go back.</p> <p>13 You said that both systems are</p> <p>14 differential systems. Could you explain that?</p> <p>15 A. Sure. Both provide the ability to</p> <p>16 allow independent movement of the left and the</p> <p>17 right rear wheels.</p> <p>18 Q. Okay. So in that context, you're</p> <p>19 saying they provide differential -- the ability</p> <p>20 to provide differential power to the right and</p> <p>21 left -- right and left wheels?</p> <p>22 A. Speed.</p> <p>23 Q. Okay, speed.</p> <p>24 Is there a difference in terms of the</p> <p>25 functionality of using a differential component</p>

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<p>1 S. Becker</p> <p>2 versus using one or more clutch packs?</p> <p>3 A. I'm sorry, you're going to have to go</p> <p>4 again.</p> <p>5 Q. Is there a difference in terms of the</p> <p>6 functionality of using a differential component</p> <p>7 versus using one or more clutch packs?</p> <p>8 A. They're both differential components</p> <p>9 unless you're talking about a -- one or more</p> <p>10 clutch packs outside the differential.</p> <p>11 Q. Yes.</p> <p>12 A. Or in combination with the</p> <p>13 differential.</p> <p>14 Q. We'll have to take them one at a</p> <p>15 time. Let's start with where the clutch packs</p> <p>16 are outside of the differential.</p> <p>17 A. So if the clutch pack's outside of</p> <p>18 the differential, then you -- you need to</p> <p>19 control how much you apply torque and monitor</p> <p>20 the speed of the two wheels relative to the</p> <p>21 movement of the vehicle, so you'd need to look</p> <p>22 at the sensors.</p> <p>23 If it's with the gearing, then you --</p> <p>24 you have differentiation and you have control</p> <p>25 scheme as to whether you want to lock the</p>	<p>1 S. Becker</p> <p>2 differential with that or bias torque just</p> <p>3 front to rear or how you connect that rear</p> <p>4 clutch pack. It depends on how you connect to</p> <p>5 the rear clutch pack.</p> <p>6 Q. Okay. Are there any functional</p> <p>7 constraints that are relevant in terms of how</p> <p>8 you arrange the various differential</p> <p>9 components?</p> <p>10 A. Well, again, it's -- it's weight,</p> <p>11 cost, NVH, performance, performance being</p> <p>12 distribution of torque and speed. And then, of</p> <p>13 course, fuel efficiency.</p> <p>14 Q. What are the different kinds of</p> <p>15 differentials that one could employ?</p> <p>16 A. There are Torsen gears; there are</p> <p>17 beveled gears; there are clutch pack design.</p> <p>18 There's one more. It's got this goofy spring</p> <p>19 thingy. I can't think of what it's called.</p> <p>20 And then there's locked differentials</p> <p>21 where they don't actually differentiate so I</p> <p>22 don't know why they call them differentials.</p> <p>23 But they're in a spot so I think that's why</p> <p>24 they call them differentials.</p> <p>25 Q. So in the context of the '440 patent</p>
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<p>1 S. Becker</p> <p>2 when they talk about having power distribution</p> <p>3 without differential gearing, do you understand</p> <p>4 that to be a system where the clutch packs</p> <p>5 would be within the differential --</p> <p>6 A. In the '440 --</p> <p>7 Q. -- or external?</p> <p>8 A. In the '440 patent, they were talking</p> <p>9 about the clutch packs being and replacing</p> <p>10 the -- the differential gearing so that changes</p> <p>11 the geometry and it becomes an RDM, or rear</p> <p>12 differential module, not a differential.</p> <p>13 Q. Okay. So it entirely eliminates the</p> <p>14 differential from the system and substitutes</p> <p>15 differential with one or more clutch packs?</p> <p>16 A. Essentially, yeah. You still --</p> <p>17 differential's still in that word, "rear</p> <p>18 differential module." It -- it eliminates the</p> <p>19 gears. Not the pinion and the ring gear, but</p> <p>20 it eliminates the bevel gears or the gerotor --</p> <p>21 the pump -- that's the other thing, spring</p> <p>22 thing. Gerotor pump differential or the Torsen</p> <p>23 gears.</p> <p>24 Q. What would be the purpose of making</p> <p>25 that kind of a change?</p>	<p>1 S. Becker</p> <p>2 A. Generally, a control scheme again is</p> <p>3 going to be cost, weight, performance, etc.</p> <p>4 Q. And those are readily substitutable</p> <p>5 to go from a bevel gear differential to one or</p> <p>6 more clutch packs?</p> <p>7 A. Well, it's not, like, readily. It's</p> <p>8 going to change those characteristics.</p> <p>9 Q. What's entailed in making that kind</p> <p>10 of a change?</p> <p>11 A. Doing the DVR -- DVPR planning and</p> <p>12 packaging, and cost, weight and NVH, again,</p> <p>13 etc., etc., the whole development.</p> <p>14 Q. So it's effectively a routine kind of</p> <p>15 process-related work?</p> <p>16 A. Well, it's a selectable component.</p> <p>17 You know, you -- you select what size engine</p> <p>18 you want, you select what size -- what type of</p> <p>19 differentiation system you want.</p> <p>20 Q. And that would be all based on the --</p> <p>21 earlier in the day we were talking about</p> <p>22 vehicle performance characteristics and that</p> <p>23 there's an array of vehicle performance</p> <p>24 characteristics that would be relevant from</p> <p>25 tractive and velocity indicia to fuel economy</p>

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<p>1 S. Becker</p> <p>2 to handling. There's half a dozen or more</p> <p>3 vehicle performance characteristics that we</p> <p>4 spoke of earlier. The desired vehicle</p> <p>5 performance characteristics then presumably</p> <p>6 impact the design of the components that are</p> <p>7 selected?</p> <p>8 A. That's exactly correct.</p> <p>9 Q. And so if you have, let's say -- I</p> <p>10 think there was seven or eight different</p> <p>11 performance characteristics that were outlined</p> <p>12 that we discussed earlier and you have, I don't</p> <p>13 know, five, six differential components to</p> <p>14 choose from, there's a fair number of</p> <p>15 permutations there that one can go through.</p> <p>16 Is it essentially -- can one be</p> <p>17 readily interchanged for the other one quite</p> <p>18 routinely?</p> <p>19 A. Well, it depends who owns the patent.</p> <p>20 Q. Oh, okay. Minus the patent side of</p> <p>21 it, in a kind of design standpoint functionally</p> <p>22 speaking.</p> <p>23 A. Yeah, functionally speaking, it's</p> <p>24 possible to interchange any of these.</p> <p>25 Again, you're going to take into</p>	<p>1 S. Becker</p> <p>2 consideration size and cost and weight and, you</p> <p>3 know, that same array. You're not going to put</p> <p>4 a really complicated system in a really cheap</p> <p>5 vehicle.</p> <p>6 Q. Do you recall in your declaration you</p> <p>7 indicated that it would be obvious for a person</p> <p>8 of skill in the art to take the front drive</p> <p>9 and -- a front drive of Teraoka, the Teraoka</p> <p>10 reference and substitute it with the rear drive</p> <p>11 of the Watanabe reference? Do you recall?</p> <p>12 A. The front drive?</p> <p>13 Q. Yes. Why don't we go to your</p> <p>14 specific declaration.</p> <p>15 A. Yeah. Can you show me what you're</p> <p>16 referring to?</p> <p>17 Q. So on page 23 of your declaration --</p> <p>18 A. Yeah.</p> <p>19 Q. -- which is Exhibit 4 here in</p> <p>20 paragraphs 45 and 46, you discuss the</p> <p>21 conclusions regarding the combination of</p> <p>22 Teraoka and Watanabe. Do you see that?</p> <p>23 A. Correct.</p> <p>24 Q. And you see in 46, if you can read</p> <p>25 for me the -- your -- the opinion that you have</p>
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<p>1 S. Becker</p> <p>2 provided in paragraph 46.</p> <p>3 A. "It would have been a matter of</p> <p>4 simple substitution to replace the rear</p> <p>5 secondary drivetrain with the rear secondary</p> <p>6 drivetrain of Watanabe to yield predictable</p> <p>7 result reducing mass and rotating losses."</p> <p>8 I should have put "if sized</p> <p>9 appropriately" after that but yeah, basically.</p> <p>10 Q. So other than that one change, you</p> <p>11 agree request this opinion today?</p> <p>12 A. Yes, still. You know, it's just</p> <p>13 implied that you would account for size because</p> <p>14 size is going to relate to everything else.</p> <p>15 Q. Sure, from -- simply from a packaging</p> <p>16 standpoint?</p> <p>17 A. Packaging, performance, weight, all</p> <p>18 that jazz.</p> <p>19 Q. So what would be entailed when you're</p> <p>20 talking about simple substitutions?</p> <p>21 What are the kinds of steps that a</p> <p>22 engineer would have to take in substituting the</p> <p>23 secondary drivetrain of Watanabe with the</p> <p>24 secondary drivetrain of Teraoka?</p> <p>25 A. Sure. Well, you would have to adapt</p>	<p>1 S. Becker</p> <p>2 your control scheme or create your control</p> <p>3 scheme. You would have to source the parts.</p> <p>4 You'd have to size the parts for durability.</p> <p>5 You'd have to adapt the housing to accommodate</p> <p>6 the geometry.</p> <p>7 You'd have to perform your stress</p> <p>8 analysis calculations to see where the weak</p> <p>9 points are, then do your modeling for NVH and</p> <p>10 friction losses and then, yeah, then it's</p> <p>11 performance testing.</p> <p>12 Q. But essentially, that's routine, that</p> <p>13 sort of -- the set of processes that you just</p> <p>14 went through?</p> <p>15 A. I don't consider any of it routine.</p> <p>16 It is what we do in the auto industry.</p> <p>17 Q. Okay. But -- so, okay, when you say</p> <p>18 "simple substitution," what is that?</p> <p>19 What does that sort of term mean to</p> <p>20 you?</p> <p>21 A. It means it's a matter of following</p> <p>22 the typical procedures of the auto industry.</p> <p>23 Q. And the --</p> <p>24 A. Or vehicle design industry, because</p> <p>25 it could apply to other vehicles.</p>

<p style="text-align: right;">Page 146</p> <p>1 S. Becker</p> <p>2 Q. Okay. And that includes the various</p> <p>3 processes and methodologies that you just</p> <p>4 outlined?</p> <p>5 A. Exactly.</p> <p>6 Q. How would one -- or what would be the</p> <p>7 rationale to substitute the drivetrain of</p> <p>8 Watanabe with the -- with the rear drivetrain</p> <p>9 of Teraoka in the first place?</p> <p>10 What would be the purpose of that?</p> <p>11 A. I guess someone would want to</p> <p>12 eliminate the bevel gears and change their</p> <p>13 control scheme.</p> <p>14 Q. Is there something in Teraoka -- oh,</p> <p>15 yeah. Okay, I'm sorry. Let me rephrase the</p> <p>16 question.</p> <p>17 So what would be the rational to</p> <p>18 substitute the drivetrain of Teraoka with the</p> <p>19 rear drivetrain of Watanabe?</p> <p>20 A. I -- I knew what you meant.</p> <p>21 Q. I'll let you repeat your answer --</p> <p>22 A. I forgot --</p> <p>23 Q. -- if you remember.</p> <p>24 A. -- my answer. It -- it's the same</p> <p>25 answer. You -- you're doing it to eliminate</p>	<p style="text-align: right;">Page 147</p> <p>1 S. Becker</p> <p>2 the -- the differential gears and alter your</p> <p>3 control scheme.</p> <p>4 Q. And is there something in the Teraoka</p> <p>5 reference that would lead a person to sort of</p> <p>6 combine Teraoka and Watanabe?</p> <p>7 A. Specifically in Teraoka?</p> <p>8 Q. Yes.</p> <p>9 A. Do you have a copy of Teraoka?</p> <p>10 (Becker Exhibit No. 5 was marked for</p> <p>11 identification.)</p> <p>12 THE WITNESS: It's in the very</p> <p>13 first paragraph.</p> <p>14 BY MS. SHAH:</p> <p>15 Q. Okay. What's specifically in the</p> <p>16 first paragraph --</p> <p>17 A. To simplify --</p> <p>18 Q. -- you're referring to?</p> <p>19 A. -- the configuration while greatly</p> <p>20 reducing the drag torque of the coupling, which</p> <p>21 is uncoupled during two-wheel drive travel.</p> <p>22 So if someone wanted to take that</p> <p>23 another step further -- not necessarily a step</p> <p>24 further, but a step further in that person's</p> <p>25 mind -- to eliminate the differential, you</p>
<p style="text-align: right;">Page 148</p> <p>1 S. Becker</p> <p>2 could do that with the clutch packs, which</p> <p>3 would be Watanabe.</p> <p>4 If someone wanted to further reduce</p> <p>5 drag torque and they could do that by opening</p> <p>6 the clutch packs, you would substitute</p> <p>7 Watanabe. So basically, everything in that</p> <p>8 sentence leads me to think that if someone were</p> <p>9 thinking that they could do that with Watanabe,</p> <p>10 they would do that.</p> <p>11 Q. But what would lead one from Teraoka</p> <p>12 to Watanabe in the first place?</p> <p>13 MS. MANDRUSIAK: Objection, asked</p> <p>14 and answered.</p> <p>15 A. You have a clutch pack already in the</p> <p>16 design of Teraoka in the differential -- or in</p> <p>17 the rear differential module. If someone else</p> <p>18 just said, hey, let's put another</p> <p>19 differential -- another clutch pack in there,</p> <p>20 or they said let's just eliminate the -- the</p> <p>21 differential, bevel gearing, you would</p> <p>22 basically be making Watanabe.</p> <p>23 BY MS. SHAH:</p> <p>24 Q. And what's --</p> <p>25 A. So then you would have to do a search</p>	<p style="text-align: right;">Page 149</p> <p>1 S. Becker</p> <p>2 for that, and you'd find Watanabe. It's not --</p> <p>3 Q. What's the purpose of the clutch pack</p> <p>4 in Teraoka? What is it used for?</p> <p>5 A. That's going to be -- well, they</p> <p>6 don't say exactly how that's used in that it</p> <p>7 can be a component of the decoupling to the</p> <p>8 side shafts. It can also be applied to vary</p> <p>9 the torque to the rear axle. So it's got sort</p> <p>10 of two functions.</p> <p>11 But the -- the actual mechanics of</p> <p>12 the coupling could be within the wet plate</p> <p>13 clutch or outside the wet plate clutch.</p> <p>14 Doesn't matter.</p> <p>15 Q. Okay. So it -- it's your opinion</p> <p>16 that in the -- in Teraoka, the clutch can be</p> <p>17 used both as a disconnect mechanism and also to</p> <p>18 deliver torque?</p> <p>19 A. Correct, yeah. It -- it's all part</p> <p>20 of the -- again, the rear differential module</p> <p>21 or 23 as outlined in -- I don't know where that</p> <p>22 figure is. I got a pile of blank pages.</p> <p>23 Figure 1.</p> <p>24 Q. So can you point to me where in</p> <p>25 Teraoka there's a discussion of the function of</p>

<p style="text-align: right;">Page 150</p> <p>1 S. Becker</p> <p>2 the clutch?</p> <p>3 A. Okay. In Claim 1, page 3, that is a</p> <p>4 really long sentence.</p> <p>5 Q. I'm sorry, you're talking about</p> <p>6 Exhibit 5, meaning the Teraoka reference?</p> <p>7 That's what you're looking at?</p> <p>8 A. Yeah, the Teraoka patent.</p> <p>9 Q. Again, at what page are you referring</p> <p>10 to in that reference?</p> <p>11 A. Page 3.</p> <p>12 Q. Okay.</p> <p>13 A. Claim 1.</p> <p>14 Q. Okay.</p> <p>15 A. So down, down -- "A coupling which is</p> <p>16 constructed using wet plate -- wet multiplate</p> <p>17 clutch disconnects rotation from the wheels</p> <p>18 during travel."</p> <p>19 And that's applied to the front-wheel</p> <p>20 side or the rear-wheel side power transmission</p> <p>21 system, the previous -- previous portion of</p> <p>22 that sentence.</p> <p>23 Q. Okay.</p> <p>24 A. That's -- you know, it's described</p> <p>25 several times.</p>	<p style="text-align: right;">Page 151</p> <p>1 S. Becker</p> <p>2 Q. All right. So is there something you</p> <p>3 can point to that -- where the clutch</p> <p>4 provides -- delivers torque?</p> <p>5 A. Delivers torque? That's the</p> <p>6 coupling. If I remember, they don't use the</p> <p>7 word "torque"; they use something else.</p> <p>8 Yeah, you have a -- in Claim -- same</p> <p>9 page, Claim 3, section 3, in the middle where</p> <p>10 the line starts 517: "A coupling 521</p> <p>11 constructed using a wet multiplate clutch, a</p> <p>12 final speed reduction gearset, a rear</p> <p>13 differential, a differential device which</p> <p>14 distributes the driving force of the engine to</p> <p>15 the left and right rear wheels."</p> <p>16 That's all part of the RDM, or the</p> <p>17 rear differential module, which is distributing</p> <p>18 the force. And then there's -- there's</p> <p>19 definitely more times where they describe it.</p> <p>20 Q. Okay. So based on -- again, you're</p> <p>21 looking at sort of what -- the paragraph that</p> <p>22 has -- that's bracketed 0003?</p> <p>23 A. Exactly.</p> <p>24 Q. In that paragraph, the lines that you</p> <p>25 just read, those paragraphs in your opinion</p>
<p style="text-align: right;">Page 152</p> <p>1 S. Becker</p> <p>2 provide evidence of the fact that the clutch</p> <p>3 delivers torque to the wheels or in this case,</p> <p>4 quote-unquote, distributes driving force to the</p> <p>5 wheels?</p> <p>6 A. Yeah, correct. It's all part of the</p> <p>7 rear differential module or what they would</p> <p>8 call 23, although they call it a final speed</p> <p>9 reduction set 23, but they're pointing to the</p> <p>10 whole module, so -- or is it 47? I might be</p> <p>11 looking at that wrong.</p> <p>12 Q. So is there any distinction between</p> <p>13 the coupling and the rear differential in -- in</p> <p>14 terms of their function in Teraoka?</p> <p>15 MS. MANDRUSIAK: Objection, form,</p> <p>16 foundation.</p> <p>17 A. Well, the rear differential itself is</p> <p>18 the whole module so the clutch is comprised</p> <p>19 inside the module.</p> <p>20 BY MS. SHAH:</p> <p>21 Q. What's the purpose of the wet</p> <p>22 multiplate clutch as compared to the dog clutch</p> <p>23 in that same paragraph [0003]?</p> <p>24 A. The dog clutch is the full axle</p> <p>25 disconnect, so you can disconnect it with the</p>	<p style="text-align: right;">Page 153</p> <p>1 S. Becker</p> <p>2 multiplate clutch. And down here, they've got</p> <p>3 a dog clutch. But I believe that dog clutch --</p> <p>4 535. Yeah, the separate drawing. Yeah, that</p> <p>5 was an alternative design. That was figure 4.</p> <p>6 So if you move the -- the multiplate</p> <p>7 clutch up to the front, you're going to meet a</p> <p>8 dog clutch down below. You can put the -- sort</p> <p>9 of the decoupling anywhere you want, but</p> <p>10 they've got -- what is it, they've got three</p> <p>11 different configurations in this patent, three</p> <p>12 main configurations, figure 1, figure 3 and</p> <p>13 figure 4. And all of them are going to perform</p> <p>14 slightly differently component-wise, but in the</p> <p>15 end, they -- they do the same thing.</p> <p>16 Q. And what is that? What do -- what do</p> <p>17 they do?</p> <p>18 A. In the end, their -- their goal is to</p> <p>19 decouple and distribute torque.</p> <p>20 Q. What kind of differential is -- is</p> <p>21 this differential device that's disclosed in</p> <p>22 Teraoka? What kind of differential is that?</p> <p>23 A. If you already know, you can tell me,</p> <p>24 but I don't recall them defining the -- the</p> <p>25 differential type.</p>

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<p>1 S. Becker</p> <p>2 Q. Okay. Let me change the question</p> <p>3 then.</p> <p>4 A. Which would mean they could put</p> <p>5 anything, any differential.</p> <p>6 Q. Okay. With respect to the rear axle,</p> <p>7 is the clutch mechanism arranged inside the</p> <p>8 differential case?</p> <p>9 A. Yes. Well in one design, yes; in</p> <p>10 another design, no.</p> <p>11 Q. So can you point to me in which</p> <p>12 design the clutch mechanism's inside the</p> <p>13 differential versus that?</p> <p>14 A. Yes, it's inside the differential</p> <p>15 case in figure 1, and in front of -- in the --</p> <p>16 yeah, in figure 2 -- 4 but not in figure 3.</p> <p>17 Figure 3's kind of weird.</p> <p>18 Q. What's the arrangement in figure 3?</p> <p>19 A. It's out on the shaft. I'm sorry,</p> <p>20 the clutch mechanism is out on one of the side</p> <p>21 shafts.</p> <p>22 Q. And what would be the purpose of that</p> <p>23 architecture?</p> <p>24 A. In that one, they talk about bevel</p> <p>25 gear differential mechanism.</p>	<p>1 S. Becker</p> <p>2 Q. I'm sorry, with respect to --</p> <p>3 A. Figure 3.</p> <p>4 Q. In figure 3 there's also a bevel</p> <p>5 gear --</p> <p>6 A. Digital.</p> <p>7 Q. -- differential?</p> <p>8 A. Yeah.</p> <p>9 Q. As well as the -- the clutch --</p> <p>10 A. Correct.</p> <p>11 Q. -- that's placed on the side shaft?</p> <p>12 A. Yeah. The clutch mechanism -- in</p> <p>13 that system, the clutch mechanism was for a</p> <p>14 coupling of the left and right.</p> <p>15 MS. MANDRUSIAK: Are you almost</p> <p>16 done with this line of questioning?</p> <p>17 MS. SHAH: Yeah.</p> <p>18 MS. MANDRUSIAK: Okay.</p> <p>19 MS. SHAH: Yeah. I'll wrap up so</p> <p>20 we can break for lunch.</p> <p>21 BY MS. SHAH:</p> <p>22 Q. Does Teraoka address any problems</p> <p>23 associated with clutch systems?</p> <p>24 A. You'd have to define what you mean by</p> <p>25 problems associated with clutch mechanisms.</p>
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<p>1 S. Becker</p> <p>2 Q. For example, specifically talking</p> <p>3 about issues with lubricating clutch</p> <p>4 mechanisms.</p> <p>5 A. Yes. Well, it mentions that there's</p> <p>6 going to be lubrication requirements.</p> <p>7 Q. Is it -- does it -- does it have an</p> <p>8 architecture that is designed to help reduce</p> <p>9 problems with lubricating clutches?</p> <p>10 A. It doesn't get into that detail.</p> <p>11 Q. Do you know if Teraoka addresses any</p> <p>12 problems of vehicle dynamics?</p> <p>13 MS. MANDRUSIAK: Objection, form.</p> <p>14 A. It does.</p> <p>15 BY MS. SHAH:</p> <p>16 Q. Can you identify them for me, please?</p> <p>17 A. Yeah. It's all over the place where</p> <p>18 it mentions a four-wheel drive system. And</p> <p>19 whenever you have a four-wheel drive system,</p> <p>20 you're affecting the vehicle dynamics.</p> <p>21 Q. So specifically does Teraoka address</p> <p>22 any problems associated with transverse or</p> <p>23 lateral equalization of power of the rear drive</p> <p>24 axle?</p> <p>25 A. Not that I'm aware of.</p>	<p>1 S. Becker</p> <p>2 Q. Does Teraoka address or suggest the</p> <p>3 use of any other system to control power to the</p> <p>4 wheels other than the differential?</p> <p>5 A. Well, it's using an RD -- a rear</p> <p>6 differential module so that in itself is a</p> <p>7 differential. It's controlling power to the</p> <p>8 rear wheels --</p> <p>9 Q. So --</p> <p>10 A. -- so yes.</p> <p>11 Q. I guess my question is, is there</p> <p>12 anything other than a differential-based system</p> <p>13 that's disclosed or suggested in Teraoka to</p> <p>14 control power to the wheels?</p> <p>15 A. Other than a differential-based</p> <p>16 system? I don't know of anything other than a</p> <p>17 differential-based system. You'd have to have</p> <p>18 split power trains like electronic wheel hubs.</p> <p>19 Q. Okay. So let me --</p> <p>20 A. So it doesn't mention electronic</p> <p>21 wheel hubs.</p> <p>22 Q. So let me refine the question a</p> <p>23 little bit.</p> <p>24 Does Teraoka address or suggest the</p> <p>25 use of a system to control power to the wheels</p>



<p style="text-align: right;">Page 158</p> <p>1 S. Becker</p> <p>2 other than one that includes bevel differential</p> <p>3 gearing?</p> <p>4 A. Again, it doesn't define its</p> <p>5 differentiation in some of the models in that,</p> <p>6 one, it mentions bevel gearing. So it doesn't</p> <p>7 specifically mention another specific type.</p> <p>8 But in several of them, it doesn't describe the</p> <p>9 differentiation. So you could theoretically</p> <p>10 have just about anything there --</p> <p>11 Q. Does --</p> <p>12 A. -- that could perform</p> <p>13 differentiation.</p> <p>14 Q. Okay. Does Teraoka provide any</p> <p>15 teachings regarding synchronizing?</p> <p>16 A. Again, Teraoka uses a clutch pack,</p> <p>17 which is a frictionally engaged multidisk</p> <p>18 plate. The design of a frictionally engaged</p> <p>19 multidisk plate is to synchronize two speeds or</p> <p>20 transmit power, so I guess that -- in default,</p> <p>21 it doesn't use the word "synchronize" here, but</p> <p>22 it uses "multiplate clutch pack," and that's</p> <p>23 what they do.</p> <p>24 Does that answer your question?</p> <p>25 Q. Yes.</p>	<p style="text-align: right;">Page 159</p> <p>1 S. Becker</p> <p>2 The dog clutch that's in Teraoka,</p> <p>3 what role, if any, does that play with respect</p> <p>4 to synchronizing?</p> <p>5 A. That's a mechanical connect and</p> <p>6 disconnect. You would synchronize before you</p> <p>7 engage a dog clutch. You would synchronize</p> <p>8 using a clutch plate or a synchronizer.</p> <p>9 Synchronizer's generally a friction plate. You</p> <p>10 can either have it circumferential or spatial.</p> <p>11 Q. Do you have to adjust the control</p> <p>12 strategy depending on what kind of clutch you</p> <p>13 have?</p> <p>14 A. Yeah, because you'd need to determine</p> <p>15 how much apply you need to obtain that</p> <p>16 synchronization so you'd have to -- yeah, it</p> <p>17 would go into the typical DVP&amp;R again.</p> <p>18 MS. SHAH: Okay, we can break.</p> <p>19 (Recess taken.)</p> <p>20 BY MS. SHAH:</p> <p>21 Q. So if we could turn back to</p> <p>22 Exhibit 3 --</p> <p>23 A. Uh-huh.</p> <p>24 Q. -- which is the '440 patent, does the</p> <p>25 '440 patent talk about the -- a -- a problem</p>
<p style="text-align: right;">Page 160</p> <p>1 S. Becker</p> <p>2 associated with power losses?</p> <p>3 A. Yes.</p> <p>4 Q. In the '440 patent, what's the --</p> <p>5 what's the proposed solution to addressing that</p> <p>6 problem? So maybe let's step back. Maybe you</p> <p>7 want to --</p> <p>8 A. That's the --</p> <p>9 Q. -- identify for me -- if you could</p> <p>10 explain to me what the problem of power losses</p> <p>11 encompasses that's described in the '440 patent</p> <p>12 then we can move to the second aspect.</p> <p>13 A. Yeah, sure. Power losses relate to</p> <p>14 various things that sap friction or create</p> <p>15 inefficiencies in the driveline system.</p> <p>16 In other words, when you're</p> <p>17 transmitting power to the ground, you want to</p> <p>18 transmit that with the least amount of</p> <p>19 components between you and the ground. That's</p> <p>20 going to have the least amount of losses.</p> <p>21 The power losses that they're</p> <p>22 discussing are related to the secondary</p> <p>23 drivetrain and the -- the connecting system.</p> <p>24 So they cite -- they cite that overcoming the</p> <p>25 power losses whereby the secondary drivetrain</p>	<p style="text-align: right;">Page 161</p> <p>1 S. Becker</p> <p>2 output in the side shaft couplings is</p> <p>3 transferred to the drive wheels in the</p> <p>4 secondary axle. And because the couplings have</p> <p>5 frictionally engaged couplings, it could be</p> <p>6 when the secondary axles uncouple, the shutdown</p> <p>7 sections located between the switch on device</p> <p>8 and the side shaft coupling is uncoupled. And</p> <p>9 that's the '440 solution to having losses in</p> <p>10 the driveline. Basically, the effect of a</p> <p>11 shutdown section.</p> <p>12 Q. Are there any -- I guess, was it</p> <p>13 known prior to May -- I'm sorry -- yeah, May 6,</p> <p>14 2008, on or before May 6, 2008 was it known to</p> <p>15 employ a shutdown section to assist with the</p> <p>16 problem of power losses?</p> <p>17 A. Yes.</p> <p>18 Q. And what do you -- can you -- you</p> <p>19 provide some support for that answer?</p> <p>20 A. Sure. Even in Teraoka they talk</p> <p>21 about -- yeah, in Teraoka in my declaration on</p> <p>22 page 21, Teraoka states -- sorry, I'll let you</p> <p>23 get there.</p> <p>24 Teraoka states: "Due to the</p> <p>25 uncoupling of the 2-4 switching mechanism 7</p>

<p style="text-align: right;">Page 162</p> <p>1 S. Becker</p> <p>2 rotation of the power transmission system,</p> <p>3 especially the large mass propeller shaft stops</p> <p>4 from the 2-4 switching mechanism to the outer</p> <p>5 case," which is the input side of each clutch</p> <p>6 mechanism, "and to the outer plates 121, 23 in</p> <p>7 the main clutch and pilot clutch."</p> <p>8 So when you have that shutdown</p> <p>9 section or you've uncoupled rotation of the</p> <p>10 power transmission system, that system's not</p> <p>11 going to create losses.</p> <p>12 Q. So what are architectural components</p> <p>13 are necessary to facilitate a -- to create a</p> <p>14 shutdown section?</p> <p>15 A. You need to be able to decouple from</p> <p>16 the prime motor on the primary drive axle and</p> <p>17 you need to uncouple from the wheels in both</p> <p>18 sections, segments.</p> <p>19 So in other words, you're going to be</p> <p>20 downstream of the front axle on the prime --</p> <p>21 primary drive -- axle, and on the secondary</p> <p>22 axle you have to be at the RDM or anywhere</p> <p>23 associated where you're decoupling the side</p> <p>24 shafts.</p> <p>25 Q. Yeah, can you -- what do you mean by</p>	<p style="text-align: right;">Page 163</p> <p>1 S. Becker</p> <p>2 RDM?</p> <p>3 A. Rear differential module. Sorry.</p> <p>4 Q. And so is that essentially -- the</p> <p>5 rear differential module, is that everything</p> <p>6 effectively after the propeller shaft?</p> <p>7 A. It can be, yeah. It's not</p> <p>8 everything. You know, you've got side shafts</p> <p>9 and then wheels and stuff.</p> <p>10 Q. So in the '440 patents, are the side</p> <p>11 shaft couplings designed to be low friction</p> <p>12 when disengaged?</p> <p>13 MS. MANDRUSIAK: Objection.</p> <p>14 A. In the '440 patent, are the side</p> <p>15 shafts designed to be low friction?</p> <p>16 BY MS. SHAH:</p> <p>17 Q. Yes.</p> <p>18 A. Well, they are designed to uncouple,</p> <p>19 uncouple with the no friction; otherwise,</p> <p>20 the -- their intention is it would stop</p> <p>21 rotation.</p> <p>22 So if it's low friction, it would</p> <p>23 still cause rotation, which is still possible</p> <p>24 because what's going to happen is when you pull</p> <p>25 those clutches apart -- we found this through</p>
<p style="text-align: right;">Page 164</p> <p>1 S. Becker</p> <p>2 testing some product of our own -- the</p> <p>3 viscosity of the oil is such that it causes the</p> <p>4 clutches to drag and can still cause rotation</p> <p>5 at higher speeds.</p> <p>6 Q. So in your claim charts you identify</p> <p>7 clutch mechanism 71 as satisfying the side</p> <p>8 shaft coupling component of the claims.</p> <p>9 A. Yeah, when the clutch mechanism</p> <p>10 inside 71 -- yeah, 71 kind of points to the --</p> <p>11 a whole ton of things point to the whole RDM.</p> <p>12 It's a very imprecise drawing. You know, it's</p> <p>13 not meant to be a detailed description of the</p> <p>14 components, it just shows that there's a clutch</p> <p>15 mechanism in there and it calls that the clutch</p> <p>16 mechanism.</p> <p>17 Q. Does the clutch mechanism 71 convey</p> <p>18 power to the rear axle side shafts?</p> <p>19 A. When engaged, yes.</p> <p>20 Q. How does it go about doing that?</p> <p>21 A. Again, inside 71, 71's the clutch</p> <p>22 plate group. So it's got a series of clutches.</p> <p>23 You've got a friction material on one side and</p> <p>24 then a steel plate, and then you've got a --</p> <p>25 you're going to have some form of actuation.</p>	<p style="text-align: right;">Page 165</p> <p>1 S. Becker</p> <p>2 As they're pulled apart, they're going to have</p> <p>3 less resistance and less drag. As they're</p> <p>4 pushed greater -- closer and harder together,</p> <p>5 they're going to create more drag. And you use</p> <p>6 the width of them, the number of clutch plates,</p> <p>7 to determine capacity.</p> <p>8 Q. What's your understanding of the</p> <p>9 purpose of a side shaft coupling?</p> <p>10 A. Well, you both have to transmit power</p> <p>11 and you have to be able to decouple; otherwise,</p> <p>12 it's not a coupling.</p> <p>13 So when you decouple, it's going to</p> <p>14 not convey power between the side shafts and</p> <p>15 the -- the exterior of the rear differential</p> <p>16 module.</p> <p>17 Q. What's the purpose of a differential</p> <p>18 25 in Teraoka?</p> <p>19 A. In their description, 25 is the --</p> <p>20 sort of the differential housing. It</p> <p>21 encompasses the differential and the clutch</p> <p>22 mechanism. So it both transmits torque and</p> <p>23 speed and distributes it left and right. And</p> <p>24 then because it contains 71, it also couples</p> <p>25 and uncouples. And it appears to also hold the</p>

<p style="text-align: right;">Page 166</p> <p>1 S. Becker</p> <p>2 final drive gearset.</p> <p>3 Q. And what's the purpose of the final</p> <p>4 drive gearset?</p> <p>5 A. That's a ratio change. A ratio</p> <p>6 change alters speed and torque.</p> <p>7 Q. Are there components of the rear</p> <p>8 differential 25 in Teraoka that continue to</p> <p>9 spin even after it's decoupled in two-wheel</p> <p>10 drive mode?</p> <p>11 A. They don't cite that specifically.</p> <p>12 In other words, they don't define where in the</p> <p>13 rear differential module the -- the coupling</p> <p>14 takes place in that drawing.</p> <p>15 That's what we call a schematic</p> <p>16 drawing so it just contains the components and</p> <p>17 then they say they're all in here.</p> <p>18 If you look at 25 specifically, the</p> <p>19 line to which it's pointing to, it -- it</p> <p>20 encompasses quite a large number of components</p> <p>21 so it doesn't disclose the specifics of the</p> <p>22 coupling.</p> <p>23 Q. And do you have an understanding of</p> <p>24 how -- of what components are -- what specific</p> <p>25 components are rotating when you decouple in</p>	<p style="text-align: right;">Page 167</p> <p>1 S. Becker</p> <p>2 the Teraoka embodiments?</p> <p>3 A. Well, 27 and 29 are the half shafts.</p> <p>4 Those will be -- or what you guys have been</p> <p>5 calling the side shafts. Those will both</p> <p>6 rotate. 31, 33 of course are the wheels. They</p> <p>7 will rotate. Yeah, that's the most detail you</p> <p>8 can get from that drawing.</p> <p>9 Q. And so now turning to Exhibit 3 of</p> <p>10 the -- which is the '440 patent, looking at,</p> <p>11 let's say, figure 2, let's start on figure 2.</p> <p>12 No, take that back.</p> <p>13 Looking at figure 8 of the '440</p> <p>14 patent, Exhibit 3, can you identify for me what</p> <p>15 components of this figure are effectively shut</p> <p>16 down when you switch from four-wheel drive to</p> <p>17 two-wheel drive mode?</p> <p>18 A. Sure. They outline 12 as the side</p> <p>19 shafts. They don't outline the wheels, of</p> <p>20 course, which will be spinning.</p> <p>21 Yeah, here they don't show the whole</p> <p>22 rear differential module. Again, this is a</p> <p>23 schematic drawing. I believe 4 is pointing to</p> <p>24 two clutches. So their decoupling is somewhere</p> <p>25 related to 4, something within 9.</p>
<p style="text-align: right;">Page 168</p> <p>1 S. Becker</p> <p>2 Q. Are there any other components that</p> <p>3 are not rotating when you're in two-wheel drive</p> <p>4 mode?</p> <p>5 A. You asked the opposite question</p> <p>6 previously, didn't you? Rotating?</p> <p>7 Q. No, so it was fine.</p> <p>8 A. So did I answer it backwards?</p> <p>9 Q. Yeah. It's fine.</p> <p>10 A. Sorry about that.</p> <p>11 Q. Essentially, I'm trying to understand</p> <p>12 what is --</p> <p>13 A. What is rotating?</p> <p>14 Q. What is rotating?</p> <p>15 A. Yeah, that -- that's what I'd</p> <p>16 answered before --</p> <p>17 Q. Okay.</p> <p>18 A. -- is what was rotating.</p> <p>19 Q. Now flip it around. What is not</p> <p>20 rotating in two-wheel drive mode?</p> <p>21 A. Everything else.</p> <p>22 Q. Is that essentially the answer?</p> <p>23 A. No.</p> <p>24 Q. Okay.</p> <p>25 A. Not rotating is 11, 19, 20, 21. I'm</p>	<p style="text-align: right;">Page 169</p> <p>1 S. Becker</p> <p>2 pretty sure 9 is intended to be a housing but I</p> <p>3 can't -- you know, again, it's a schematic</p> <p>4 drawing so I don't know if that's moving or</p> <p>5 not. 18 I believe is not moving. 14, yeah.</p> <p>6 There's no more precise detail about 16 and 15.</p> <p>7 Q. Are there specifics to the</p> <p>8 architecture that's described in figure 8 that</p> <p>9 provide a more expansive shutdown section?</p> <p>10 A. Are there what?</p> <p>11 Q. Other details of the figure 8 design</p> <p>12 that lead to a -- an expanded shutdown section?</p> <p>13 MS. MANDRUSIAK: Objection, form.</p> <p>14 A. Yeah, I don't know what "expanded"</p> <p>15 means. Expanded to what? Compared to what?</p> <p>16 BY MS. SHAH:</p> <p>17 Q. Let's say compared to Teraoka.</p> <p>18 A. Not specifically. Not in figure 8.</p> <p>19 Q. So are there any differences between</p> <p>20 the shutdown section in Teraoka versus the one</p> <p>21 in the '440 patent?</p> <p>22 A. They're drawn differently so you --</p> <p>23 you've got a different clutch mechanism. You</p> <p>24 got two clutches in figure 8 and you don't have</p> <p>25 two clutches in Teraoka. So a portion of the</p>

<p style="text-align: right;">Page 170</p> <p>1 S. Becker</p> <p>2 two-clutch system will be moving and a portion</p> <p>3 will not.</p> <p>4 Q. Any other differences?</p> <p>5 A. Not specifically.</p> <p>6 Q. In the '440 patent, can you point to</p> <p>7 me which component in your opinion constitutes</p> <p>8 the side shaft coupling? Starting with figure</p> <p>9 3.</p> <p>10 A. Well, they outline that the switch on</p> <p>11 mechanism and/or side shaft couplings comprise</p> <p>12 at least one frictionally engaged coupling. So</p> <p>13 there, they would be describing the</p> <p>14 frictionally engaged couplings being, excuse</p> <p>15 me, clutch packs, so that would be -- was I</p> <p>16 supposed to pick out the figure?</p> <p>17 Q. Yes, if you could look at figure 3</p> <p>18 and then --</p> <p>19 A. Yeah.</p> <p>20 Q. -- identify for me what you --</p> <p>21 A. Well, figure 5 is a more detailed</p> <p>22 version of the rear of figure 3.</p> <p>23 Q. Okay.</p> <p>24 A. So item 7 would still be rotating,</p> <p>25 and 29 would still be rotating. It's difficult</p>	<p style="text-align: right;">Page 171</p> <p>1 S. Becker</p> <p>2 to tell if 5 or 6 -- I believe it's 5 is</p> <p>3 rotating and 6 is not. I have to look that up.</p> <p>4 But definitely 26 and 8 are not rotating.</p> <p>5 Q. Okay. And so, I'm sorry, in figure</p> <p>6 5, which component is what you point to as</p> <p>7 being the side shaft coupling?</p> <p>8 A. Oh, well, the RDM, the whole rear</p> <p>9 differential module. So basically, figure --</p> <p>10 the whole thing. Yeah, I think in figure 3</p> <p>11 they just -- I think it's number 9.</p> <p>12 Q. So when you look at -- turning to the</p> <p>13 claims of the '440 patents, which is on the</p> <p>14 last two pages --</p> <p>15 A. Yeah.</p> <p>16 Q. -- of the '440 patent,</p> <p>17 Exhibit Number 3, can you identify the -- a</p> <p>18 distinction between Claim 1 and Claim 2?</p> <p>19 MS. MANDRUSIAK: Objection, form.</p> <p>20 A. Yeah, Claim 1 is that there's going</p> <p>21 to be a shutdown section and there's going to</p> <p>22 be a primary and a secondary drive axle.</p> <p>23 Claim 2 is that you're going to do this without</p> <p>24 having differential gearing.</p> <p>25 BY MS. SHAH:</p>
<p style="text-align: right;">Page 172</p> <p>1 S. Becker</p> <p>2 Q. So how do you go about achieving that</p> <p>3 under the '440 patent? The architecture in</p> <p>4 Claim 2.</p> <p>5 A. Oh, sure. Claim 2 in '440 is</p> <p>6 basically describing figure 3. The embodiment</p> <p>7 of what's basically 9, the -- the rear</p> <p>8 differential module, does not have differential</p> <p>9 gears. It does have two ring gears and one</p> <p>10 pinion but no differential gears.</p> <p>11 Q. And is it -- it's your opinion that</p> <p>12 substituting the -- so this gets back to -- I</p> <p>13 don't know if we identified -- so if you were</p> <p>14 to substitute the rear drivetrain of Watanabe</p> <p>15 with the rear drivetrain of Teraoka, that -- I</p> <p>16 guess can you identify for me what the</p> <p>17 advantage of that substitution would be?</p> <p>18 MS. MANDRUSIAK: Objection, form.</p> <p>19 A. Well, as Watanabe says, you're still</p> <p>20 going to use a single ring gear but you're</p> <p>21 going to achieve differentiation without the</p> <p>22 differential gears.</p> <p>23 So the intention would be that you</p> <p>24 have this now differential without the gearing</p> <p>25 so it's not a -- a constantly open differential</p>	<p style="text-align: right;">Page 173</p> <p>1 S. Becker</p> <p>2 and you can control it however you want to. I</p> <p>3 believe that's implied -- no, that's actually</p> <p>4 stated, can be adjusted and the differential</p> <p>5 rotation can be controlled.</p> <p>6 Q. Does Watanabe contemplate a shutdown</p> <p>7 section?</p> <p>8 A. If you could provide Watanabe for</p> <p>9 me --</p> <p>10 Q. Sure.</p> <p>11 (Becker Exhibit No. 6 was marked for</p> <p>12 identification.)</p> <p>13 THE WITNESS: Yeah, because we're</p> <p>14 calling a shutdown section a section</p> <p>15 that doesn't rotate, and Watanabe says</p> <p>16 that they're applicable to both</p> <p>17 two-wheel drive and four-wheel drive</p> <p>18 vehicles. They don't describe a</p> <p>19 shutdown section; they talk about</p> <p>20 shutting down torque, not speed.</p> <p>21 BY MS. SHAH:</p> <p>22 Q. So if you substitute the rear</p> <p>23 drivetrain of Watanabe with the rear drive --</p> <p>24 I'm sorry, flip it around.</p> <p>25 If you have the -- the full system of</p>

<p style="text-align: right;">Page 174</p> <p>1 S. Becker</p> <p>2 Teraoka and you substitute the rear drivetrain</p> <p>3 of Watanabe into the system of Teraoka, is</p> <p>4 there a benefit in terms of fuel economy?</p> <p>5 A. That would depend on the</p> <p>6 mechatronics, your control scheme. You can</p> <p>7 potentially reduce weight, and you can</p> <p>8 potentially open these clutches up to provide a</p> <p>9 shutdown section which would, as Teraoka</p> <p>10 teaches, you have a shutdown section and then</p> <p>11 have a fuel economy benefit.</p> <p>12 But Watanabe all by itself compared</p> <p>13 to Teraoka all by itself, Watanabe, because it</p> <p>14 can be used in the front, the rear, or anyplace</p> <p>15 isn't necessarily for a fuel economy. It's for</p> <p>16 this control. The result of that control, as</p> <p>17 you're taught by Teraoka, is fuel economy</p> <p>18 savings.</p> <p>19 Q. How would -- so what's your</p> <p>20 understanding in terms of how a person of skill</p> <p>21 in the art -- what would lead a person of skill</p> <p>22 in the art to -- to start off with Teraoka and</p> <p>23 then pull in disclosure from Watanabe? What --</p> <p>24 A. Well --</p> <p>25 Q. What prompts that?</p>	<p style="text-align: right;">Page 175</p> <p>1 S. Becker</p> <p>2 A. Sure.</p> <p>3 MS. MANDRUSIAK: Objection.</p> <p>4 Objection, form. Objection, asked and</p> <p>5 answered.</p> <p>6 A. Several things. First, you have to</p> <p>7 have the concept that you want to eliminate</p> <p>8 your differential gearing. When you do that,</p> <p>9 you then are looking at what you're doing for</p> <p>10 an alternative differential system. You would</p> <p>11 then potentially apply Watanabe. You may apply</p> <p>12 Torsen. You may apply a gerotor system.</p> <p>13 BY MS. SHAH:</p> <p>14 Q. I'm sorry, let me back up. So why</p> <p>15 would one want to eliminate the -- the bevel</p> <p>16 differential gearing system?</p> <p>17 A. You're probably looking for an</p> <p>18 alternative, and that alternative may be an</p> <p>19 alternative control schema, or potentially</p> <p>20 you're looking for a weight savings. There may</p> <p>21 be a weight savings in eliminating the</p> <p>22 differential housing in bevel gears. What</p> <p>23 else? I mean, the fact that they both worked</p> <p>24 for the same company would lead someone who's</p> <p>25 looking at one to find the other.</p>
<p style="text-align: right;">Page 176</p> <p>1 S. Becker</p> <p>2 Q. I'm sorry, "they both" who?</p> <p>3 A. Tochigi Fuji. Tochigi Fuji are</p> <p>4 Watanabe and Teraoka.</p> <p>5 Q. I'm sorry, so is there more to your</p> <p>6 answer?</p> <p>7 A. No, no. I'm sorry.</p> <p>8 Q. Okay. Are bevel differentials used</p> <p>9 today?</p> <p>10 A. Definitely.</p> <p>11 Q. What are some of the trade-offs</p> <p>12 associated with using a bevel differential?</p> <p>13 A. Trade-offs to what?</p> <p>14 Q. In terms of like the system</p> <p>15 architecture and vehicle performance</p> <p>16 characteristics.</p> <p>17 A. Well, sorry, when you trade something</p> <p>18 off, you have to trade it off for something</p> <p>19 else.</p> <p>20 Q. Okay. So -- fair enough. So let's</p> <p>21 say if you're going to -- what are -- let's</p> <p>22 start with the basics, then.</p> <p>23 If -- in lieu of a beveled -- beveled</p> <p>24 gear differential system, what else could you</p> <p>25 replace it with?</p>	<p style="text-align: right;">Page 177</p> <p>1 S. Becker</p> <p>2 What are the options?</p> <p>3 A. Torsen differential; again, a clutch</p> <p>4 differential; a locked differential; or a</p> <p>5 permanently open differential.</p> <p>6 Q. And how would one choose between</p> <p>7 those various other options if one decided that</p> <p>8 they wanted to eliminate the bevel gear</p> <p>9 differential?</p> <p>10 A. It comes down to cost and</p> <p>11 performance. And, you know, usually you do a</p> <p>12 features/benefit analysis where you end up with</p> <p>13 one of those little circles of each feature and</p> <p>14 its capability for each design. I forget what</p> <p>15 that's called. There's a name for it.</p> <p>16 Q. Is there a difference in terms of</p> <p>17 performance between having locked clutches and</p> <p>18 partially locked clutches?</p> <p>19 A. Again, that would determine what</p> <p>20 performance you need.</p> <p>21 Q. Let's say in the context of yaw</p> <p>22 moment.</p> <p>23 A. Of yaw moment?</p> <p>24 Q. Yes.</p> <p>25 A. Okay. So you can correct for a yaw</p>

<p style="text-align: right;">Page 178</p> <p>1 S. Becker</p> <p>2 moment with a partial applied clutch. You</p> <p>3 can't with a fully locked clutch.</p> <p>4 Q. And how does one -- so that I assume</p> <p>5 the -- the locking, whether it's fully locked</p> <p>6 or partially locked, is a -- again, a design</p> <p>7 choice?</p> <p>8 Or are there performance</p> <p>9 characteristics that are relevant?</p> <p>10 A. Exactly. Performance characteristics</p> <p>11 and a design choice.</p> <p>12 Q. Is it just yaw moment that's affected</p> <p>13 or are there other characteristics that are</p> <p>14 affected by that choice?</p> <p>15 A. A number of other characteristics.</p> <p>16 When you lock the clutch, if you just lock it,</p> <p>17 you're driving both system -- you know,</p> <p>18 whatever you're locking between the two</p> <p>19 couplings, it's fully transmitting all the</p> <p>20 torque when you partially apply some torque</p> <p>21 going somewhere else. So you have to decide</p> <p>22 why you want to do what. Also, partial apply</p> <p>23 will decrease the life of the clutch as well.</p> <p>24 Q. When you -- if one was to substitute</p> <p>25 a -- an open differential with two clutch</p>	<p style="text-align: right;">Page 179</p> <p>1 S. Becker</p> <p>2 packs, what are the various considerations and</p> <p>3 changes that are required to facilitate that</p> <p>4 substitution?</p> <p>5 A. Depends on what type open</p> <p>6 differential you're talking about.</p> <p>7 Q. So what are the different kinds of</p> <p>8 open differentials?</p> <p>9 A. Bevel gear, which is what you were</p> <p>10 discussing before, and then just a -- a -- a</p> <p>11 completely open differential. So you're just</p> <p>12 driving one side.</p> <p>13 Q. Okay. So let's focus on the bevel</p> <p>14 gear differential.</p> <p>15 If you are substituting a system that</p> <p>16 has a bevel gear differential for one now that</p> <p>17 would have two clutches, what changes need to</p> <p>18 be made to that system to facilitate that</p> <p>19 change?</p> <p>20 A. Well, you need to supply electronics</p> <p>21 because now, you're -- you have to -- you have</p> <p>22 to develop a control scheme, you have to --</p> <p>23 you're going to be necessitated to monitor</p> <p>24 speed at each wheel.</p> <p>25 And then you have all your geometry</p>
<p style="text-align: right;">Page 180</p> <p>1 S. Becker</p> <p>2 concerns. You have to make the clutches fit in</p> <p>3 whatever rear differential module you're</p> <p>4 creating.</p> <p>5 You're going to have your sourcing</p> <p>6 issues. You got to purchase the clutch packs.</p> <p>7 And then you're going to have your life</p> <p>8 testing. You're going to have your NVH where</p> <p>9 you may have clutch moan, clutch squeal, or</p> <p>10 clutch judder. J-U-D-D-E-R, or something like</p> <p>11 that.</p> <p>12 Yeah, so you need to look at all of</p> <p>13 those things. Also the lubricant breakdown's</p> <p>14 going to be a more significant factor affecting</p> <p>15 clutches than a bevel gearset.</p> <p>16 Q. Why is that?</p> <p>17 A. Because bevel gears are just gears.</p> <p>18 They're not predicated on purposeful frictional</p> <p>19 characteristics except for their life.</p> <p>20 The clutch packs are really keen on</p> <p>21 their fluid content, fluid friction rate.</p> <p>22 Q. So if you take the dual clutch system</p> <p>23 that's disclosed in Watanabe, does that result</p> <p>24 in more fuel consumption compared to the</p> <p>25 differential system that's based in Teraoka?</p>	<p style="text-align: right;">Page 181</p> <p>1 S. Becker</p> <p>2 A. More fuel consumption?</p> <p>3 Q. Yes.</p> <p>4 A. Again, it's going to be a "depends"</p> <p>5 answer. If you design it right, no.</p> <p>6 Q. And what does it depend on?</p> <p>7 A. It's going to depend on your sizing,</p> <p>8 complexity. If -- in Teraoka if you've got a</p> <p>9 second -- separate dog clutch or not or if you</p> <p>10 are just using your friction plates as your,</p> <p>11 you know, coupling device.</p> <p>12 In Watanabe, you've now got two</p> <p>13 clutch packs so you've got to account for their</p> <p>14 decoupling so you're going to need the -- the</p> <p>15 space for that and everything else. So all</p> <p>16 those will play factors.</p> <p>17 Q. Is there a specific problem that's</p> <p>18 being addressed in Watanabe?</p> <p>19 A. Yeah, well, Watanabe's intention is</p> <p>20 to be capable of eliminating the gears while</p> <p>21 improving the controllability all in one</p> <p>22 package.</p> <p>23 Q. Can you point to something, a section</p> <p>24 of Watanabe that provides that teaching?</p> <p>25 A. Yeah, the -- the same section I</p>

<p style="text-align: right;">Page 182</p> <p>1 S. Becker</p> <p>2 described before. The distribution ratio --</p> <p>3 it's in my disclosure on page 24.</p> <p>4 Q. This is of your declaration?</p> <p>5 A. Correct, declaration.</p> <p>6 Q. Okay. Go ahead.</p> <p>7 A. Above the figure, you've got "to</p> <p>8 allow power distribution without differential</p> <p>9 gearing between the drive wheels."</p> <p>10 And then below the drawing, you have</p> <p>11 "and by increasing and decreasing the</p> <p>12 tightening force individually for the multiple</p> <p>13 plate clutches, the distribution ratio of the</p> <p>14 power between the right and left rear wheels</p> <p>15 can be adjusted and differential rotation can</p> <p>16 be controlled."</p> <p>17 Q. And again, those sentences are on</p> <p>18 pages 20 and 21 of your declaration?</p> <p>19 A. 4. 24. I'm sorry.</p> <p>20 MS. SHAH: Oh, I'm sorry. Okay,</p> <p>21 can you -- maybe we don't have this.</p> <p>22 Yeah, if we can just go off the record</p> <p>23 for one minute.</p> <p>24 (Discussion held off the record.)</p> <p>25 BY MS. SHAH:</p>	<p style="text-align: right;">Page 183</p> <p>1 S. Becker</p> <p>2 Q. I'm sorry, so you said page 24;</p> <p>3 right?</p> <p>4 A. Yes.</p> <p>5 Q. All right.</p> <p>6 A. So the paragraph above the diagram</p> <p>7 and the paragraph below were what I read.</p> <p>8 Q. Other than this, is there any support</p> <p>9 in -- sort of in Watanabe with respect to the</p> <p>10 issue of -- I guess with respect to the issue</p> <p>11 of what -- what the goal or the purpose of</p> <p>12 Watanabe is?</p> <p>13 A. I mean, that pretty much sums it up.</p> <p>14 It's probably elsewhere in -- in Watanabe, but</p> <p>15 that's their main purpose.</p> <p>16 Q. Can you point to something</p> <p>17 specifically within the text of Watanabe that</p> <p>18 talks about wanting power distribution without</p> <p>19 differential gearing?</p> <p>20 A. Yeah, they don't contrast and compare</p> <p>21 to a -- a bevel gear system. Just the fact</p> <p>22 that the drawings lack bevel gear, differential</p> <p>23 gears, is the indication that there's no gear.</p> <p>24 Q. Okay. So there's no mention in</p> <p>25 Watanabe regarding a power distribution system</p>
<p style="text-align: right;">Page 184</p> <p>1 S. Becker</p> <p>2 that's intended to remove bevel gear</p> <p>3 differential gearing --</p> <p>4 MS. MANDRUSIAK: Objection.</p> <p>5 Q. -- is that right?</p> <p>6 A. Well --</p> <p>7 MS. MANDRUSIAK: Objection, form,</p> <p>8 mischaracterizes his testimony.</p> <p>9 A. It's a differential and it doesn't</p> <p>10 have bevel gears. Just because it doesn't say</p> <p>11 it doesn't have bevel gears doesn't mean it</p> <p>12 doesn't have bevel gears. So the -- as the</p> <p>13 common differential has bevel gears, one would</p> <p>14 assume this is to replace a system that has</p> <p>15 bevel gears.</p> <p>16 But you could replace equally as well</p> <p>17 a Torsen system or a gerotor system or -- or</p> <p>18 other differential. It doesn't contrast and</p> <p>19 compare.</p> <p>20 BY MS. SHAH:</p> <p>21 Q. On or before the relevant time period</p> <p>22 here, which is May 6, 2008, was there a desire</p> <p>23 in the industry to eliminate bevel gear</p> <p>24 differentials?</p> <p>25 A. Not by me. I don't know about</p>	<p style="text-align: right;">Page 185</p> <p>1 S. Becker</p> <p>2 everybody else. It was discussed. Actually, I</p> <p>3 do remember a discussion about it.</p> <p>4 We were talking about making the --</p> <p>5 what was it, the -- not the Patriot, the</p> <p>6 Compass, the Jeep Compass capable of sending</p> <p>7 torque left and right, and there was a</p> <p>8 discussion about either making that into a posi</p> <p>9 or eliminating the differential and using two</p> <p>10 clutch backs. So there was a discussion about</p> <p>11 it. I don't know what became of it.</p> <p>12 Q. And when you say "we" here, you're</p> <p>13 referring to whom?</p> <p>14 A. A number of folks at Magna Powertrain</p> <p>15 and myself. And I think some Jeep guys were</p> <p>16 there.</p> <p>17 Q. So you mentioned there were three or</p> <p>18 four other sort of -- oh, I'm sorry, I'll go</p> <p>19 back.</p> <p>20 So there's a Torsen. Well, let's</p> <p>21 see. There's a list. You provided me a list</p> <p>22 of other systems that could be used in place of</p> <p>23 a differential. Maybe you can just identify</p> <p>24 those for me again.</p> <p>25 A. Sure. Bevel gear, clutches, Torsen,</p>

Page 186	Page 187
<p>1 S. Becker</p> <p>2 and then you've got a locked open and locked</p> <p>3 closed solid.</p> <p>4 Q. What are the considerations in moving</p> <p>5 from, sort of, and employing each of those</p> <p>6 systems?</p> <p>7 A. Well, the locked open's the -- the</p> <p>8 one that's used in gocarting and some -- some</p> <p>9 other systems. What is that? All's I can</p> <p>10 think of at the moment's the gocarting.</p> <p>11 The solid lock is used a lot in</p> <p>12 off-road vehicles, which also includes some</p> <p>13 UTVs and ATVs.</p> <p>14 Torsen, that's going to be a -- it's</p> <p>15 also partially a traction control device in</p> <p>16 addition to a differential because it --</p> <p>17 because of the geometry of the gears, it biases</p> <p>18 torque against slippage at higher speeds.</p> <p>19 And again, you've got the -- the twin</p> <p>20 clutch system.</p> <p>21 THE REPORTER: I'm sorry, the?</p> <p>22 THE WITNESS: Twin clutch system,</p> <p>23 where you're going to be adding</p> <p>24 complexity to the development and adding</p> <p>25 mechatronics. And then you've got the</p>	<p>1 S. Becker</p> <p>2 bevel gear system, which is historically</p> <p>3 simpler.</p> <p>4 I'm thinking there's also another</p> <p>5 one. Oh, yeah, the -- the Droder pump</p> <p>6 where you've got a -- a Droder pump and</p> <p>7 a viscous lock. That's a fairly simple</p> <p>8 system, but you have less control over</p> <p>9 it.</p> <p>10 BY MS. SHAH:</p> <p>11 Q. So you mentioned that for ATVs and</p> <p>12 other off-road type vehicles, it's likely that</p> <p>13 you would go with a locked differential</p> <p>14 arrangement; is that correct?</p> <p>15 A. Yeah. I'm not saying I would; I'm</p> <p>16 saying they're out there.</p> <p>17 Q. And so I guess the question is, is it</p> <p>18 typically the case that ATVs would have --</p> <p>19 include a locked differential?</p> <p>20 MS. MANDRUSIAK: Objection, form.</p> <p>21 A. Again, I can only refer to a few of</p> <p>22 the products I've worked with had that. Other</p> <p>23 products do not, so it -- I wouldn't</p> <p>24 characterize it one way or the other.</p> <p>25 BY MS. SHAH:</p>
Page 188	Page 189
<p>1 S. Becker</p> <p>2 Q. What's the rationale for including a</p> <p>3 locked differential with an ATV vehicle?</p> <p>4 A. It's cheaper.</p> <p>5 Q. Anything else?</p> <p>6 A. Then you get more -- well, you kind</p> <p>7 of get more traction. You get less wheel slip.</p> <p>8 And then you are requiring wheel slip when you</p> <p>9 go into corners so it's not good for cornering,</p> <p>10 so there -- you know, there's drawbacks and</p> <p>11 benefits.</p> <p>12 Q. What are all the various sort of</p> <p>13 vehicle performance characteristics that are</p> <p>14 distinct between an ATV and a traditional, you</p> <p>15 know, road conventional car?</p> <p>16 A. Well --</p> <p>17 MS. MANDRUSIAK: Objection, form.</p> <p>18 A. Well, again the ATV is looking at</p> <p>19 only off-road action, on -- you know, on-road</p> <p>20 performance, smoothness, roughness, none of</p> <p>21 those things are really considered with the ATV</p> <p>22 generally.</p> <p>23 They're getting better, but that's</p> <p>24 not usually a -- a high priority on their list.</p> <p>25 Cost is usually a higher priority.</p>	<p>1 S. Becker</p> <p>2 BY MS. SHAH:</p> <p>3 Q. So because of the kind of altered</p> <p>4 focus of the desired vehicle performance</p> <p>5 characteristics does the architecture change</p> <p>6 for an ATV as compared to -- the driveline</p> <p>7 architecture of an ATV as compared to a</p> <p>8 conventional vehicle?</p> <p>9 A. Again, that's going to depend on the</p> <p>10 ATV. Again, if you -- if you -- if you're</p> <p>11 talking like England, they're talking Land</p> <p>12 Rovers as ATVs. Land Rover's the same as an</p> <p>13 on-road car.</p> <p>14 In America, when you talk ATV or UTV,</p> <p>15 a utility train vehicle, you're talking like a</p> <p>16 Yamaha, a Rhino, or a RZR or Powerhand, the</p> <p>17 Gator from John Deere, etc.</p> <p>18 Of the ones I just named, I -- I</p> <p>19 think all of them use completely different</p> <p>20 systems so I can't characterize it as one</p> <p>21 versus another.</p> <p>22 MS. SHAH: Okay, let me mark some</p> <p>23 exhibits. This will be 7.</p> <p>24 (Recess taken.)</p> <p>25 (Becker Exhibit No. 7 was marked for</p>



<p style="text-align: right;">Page 190</p> <p>1 S. Becker 2 identification.) 3 BY MS. SHAH: 4 Q. Mr. Decker, during the break did you 5 have any substantive discussions with your 6 counsel about this case? 7 A. No. 8 Q. Okay. I'm sorry? 9 A. Did you say Decker? It's Becker. 10 Q. I think that's what I said. Let's 11 see what the record says. Okay. 12 If you could turn to page 19 of 13 Exhibit 7, which is the petition that was filed 14 in this case, have you seen this exhibit 15 before? 16 A. I don't know. 17 Q. I'm sorry, if you could turn to page 18 19 of the -- of Exhibit 3. 19 A. Yeah. 20 Q. I'm sorry, Exhibit 7, the petition. 21 A. Okay. 22 Q. So, for example, if you look at the 23 second paragraph on page 19 -- 24 A. Uh-huh. 25 Q. -- do you -- and if you compare that</p>	<p style="text-align: right;">Page 191</p> <p>1 S. Becker 2 to page 23 of your declaration -- 3 A. Yeah. 4 Q. I'm sorry, which is Exhibit 4. So if 5 we compare page 23 of Exhibit 4 to page 19 of 6 the petition, is there any difference between 7 that second paragraph and both of those pages? 8 A. I think just the citation. 9 Q. Did you -- this language that's in 10 here, did you draft that language in your 11 declaration? 12 A. I drafted the declaration. That may 13 have come up, part of the discussion with my 14 client. 15 Q. And now turning to the charts 16 themselves, which are pages 23 through 25 of 17 Exhibit 4, your declaration as compared to 18 pages 20 through 21 of Exhibit 7, the petition 19 in this case, other than the citations, can you 20 point to any differences in the substance? 21 MS. MANDRUSIAK: Objection, 22 relevance. 23 A. Yeah, page 25 versus page 21. 25 in 24 my deck and 21 of the document you sent me, 25 Exhibit 7.</p>
<p style="text-align: right;">Page 192</p> <p>1 S. Becker 2 BY MS. SHAH: 3 Q. Okay, yes. 4 A. At the bottom, "Therefore, Watanabe 5 discloses --" 6 THE WITNESS: I'm sorry, sir. If 7 you're going to read, you must read 8 slowly. 9 A. "Therefore, Watanabe discloses 10 longitudinal compensation by the clutches 89 11 and 91." 12 Q. So other than that one difference, 13 are these charts effectively the same? 14 A. I haven't finished. 15 Q. Okay. 16 A. Yes. 17 Q. And did you prepare these claim 18 charts, the ones that are in your declaration, 19 for example, the ones that we just referred to 20 on pages 23 through 25 of Exhibit 4? 21 MS. MANDRUSIAK: Objection, asked 22 and answered. 23 A. Again, that's part of my declaration. 24 Q. I'm sorry, can you answer the 25 question?</p>	<p style="text-align: right;">Page 193</p> <p>1 S. Becker 2 MS. MANDRUSIAK: Objection. He did 3 answer the question. 4 Q. So you prepared them? 5 A. It's part of my declaration, yeah. I 6 agreed to them. 7 Q. Okay. So when you agreed to them, 8 does that mean that you were provided them and 9 you inserted them into your declaration? 10 MS. MANDRUSIAK: Objection, 11 mischaracterizes his testimony. 12 MS. SHAH: I'm asking the question. 13 THE WITNESS: Yeah, these charts 14 are a result of discussion with my 15 client. 16 BY MS. SHAH: 17 Q. Okay, I'm sorry. I'm not sure if 18 I -- I have a specific question, which was were 19 you provided the charts and did you then insert 20 them into your declaration? 21 A. Again, I -- I didn't see this 22 specific document, Exhibit 7, so I can't 23 comment as to whether this came from that 24 document or whatnot. All's I can state is that 25 they are -- they do look similar. There's a</p>

<p style="text-align: right;">Page 194</p> <p>1 S. Becker</p> <p>2 few minor changes.</p> <p>3 Q. Is there any specific content in your</p> <p>4 declaration that you independently authored?</p> <p>5 MS. MANDRUSIAK: Objection, form.</p> <p>6 A. Definitely, yes.</p> <p>7 BY MS. SHAH:</p> <p>8 Q. And can you point to which sections</p> <p>9 of your declaration you independently authored?</p> <p>10 A. Not specifically, no.</p> <p>11 MS. SHAH: Okay.</p> <p>12 (Becker Exhibit No. 8 was marked for</p> <p>13 identification.)</p> <p>14 BY MS. SHAH:</p> <p>15 Q. So just to clean up the last set of</p> <p>16 questions we had, the claim charts that are</p> <p>17 included in your declaration, for example, the</p> <p>18 ones this we've been looking at that are on</p> <p>19 pages 23 to 25 of -- of the Becker declaration,</p> <p>20 did you independently author those claim</p> <p>21 charts?</p> <p>22 MS. MANDRUSIAK: Objection, asked</p> <p>23 and answered, repeatedly at this point.</p> <p>24 THE WITNESS: Again, those were</p> <p>25 discussions with my client.</p>	<p style="text-align: right;">Page 195</p> <p>1 S. Becker</p> <p>2 BY MS. SHAH:</p> <p>3 Q. So if we can turn to Exhibit 8, which</p> <p>4 is the Burrows patent --</p> <p>5 A. Yes.</p> <p>6 Q. -- can you tell me what the mechanism</p> <p>7 is for synchronizing in the Burrows patent?</p> <p>8 A. Burrows discusses using a clutch to</p> <p>9 cause synchronization.</p> <p>10 Q. Are there --</p> <p>11 A. Clutches.</p> <p>12 Q. Does Burrows contemplate simultaneous</p> <p>13 engagement into four-wheel drive, or is there</p> <p>14 some alternate mechanism that's described?</p> <p>15 A. I don't know what you mean.</p> <p>16 Q. Well, describe for me the system of</p> <p>17 synchronizing that's taught in Burrows.</p> <p>18 A. Well, Burrows has a front-wheel drive</p> <p>19 engine transmission that goes to a power</p> <p>20 takeoff or transfer case unit.</p> <p>21 In there, there's a clutch that can</p> <p>22 be engaged or disengaged to synchronize the</p> <p>23 driveline of the rear driveline, front</p> <p>24 driveline.</p> <p>25 Additionally, they talk about</p>
<p style="text-align: right;">Page 196</p> <p>1 S. Becker</p> <p>2 disconnecting the main rear driveshaft in the</p> <p>3 rear drive unit, which is essentially 51 in</p> <p>4 figure 3. And so there may be a second clutch</p> <p>5 as outlined on page 2, paragraph 20, where</p> <p>6 there's a second clutch located between the</p> <p>7 differential and a second pair of wheels.</p> <p>8 Q. Okay. Do you see the abstract on</p> <p>9 page 1 of Exhibit 8?</p> <p>10 A. Yes.</p> <p>11 Q. Does the -- actually, the second line</p> <p>12 from the bottom talks about -- begins with the</p> <p>13 words "changing from two-wheel to four-wheel</p> <p>14 drive."</p> <p>15 A. Yes.</p> <p>16 Q. Do you see where that is?</p> <p>17 A. Definitely.</p> <p>18 Q. Yeah, could you read that sentence</p> <p>19 into the record, please?</p> <p>20 A. Sure. "Changing from two-wheel to</p> <p>21 four-wheel drive is controlled so that the</p> <p>22 engine 11 or the second pair of wheels,</p> <p>23 typically, the rear wheels, 14 and 15, to</p> <p>24 rotate at least part of the auxiliary driveline</p> <p>25 21 for sufficient time period prior to fully</p>	<p style="text-align: right;">Page 197</p> <p>1 S. Becker</p> <p>2 reconnecting it to provide drive torque to the</p> <p>3 rear wheels 14 and 15."</p> <p>4 Q. Okay. And we may have skipped a</p> <p>5 line, but --</p> <p>6 A. I did?</p> <p>7 Q. That's fine. We can -- that --</p> <p>8 that's fine. It's not in the abstract. I</p> <p>9 understand.</p> <p>10 I guess the question I have here is</p> <p>11 this -- sort of this step of rotating at least</p> <p>12 part of the auxiliary driveline for a</p> <p>13 sufficient time period, do you see that</p> <p>14 portion --</p> <p>15 A. Yes.</p> <p>16 Q. -- of the sentence you just read?</p> <p>17 How would that impact power losses?</p> <p>18 A. Well, you're trying to connect</p> <p>19 four-wheel drive, so as you connect four-wheel</p> <p>20 drive, as you spin that up, that's going to be</p> <p>21 a power loss. It's going to cause drag on the</p> <p>22 vehicle.</p> <p>23 Q. And in Teraoka, do they describe this</p> <p>24 sort of kind of rotation step to facilitate</p> <p>25 synchronization?</p>

<p style="text-align: right;">Page 198</p> <p>1 S. Becker</p> <p>2 A. No, Teraoka doesn't discuss the pause</p> <p>3 or -- what was it? The short period of time?</p> <p>4 What do they call it? Sufficient time period.</p> <p>5 Teraoka does not discuss the sufficient time</p> <p>6 period to spin up the driveshaft.</p> <p>7 Q. Okay. Does Teraoka actually talk</p> <p>8 about simultaneous engagement?</p> <p>9 A. I would have to do a search for the</p> <p>10 word "simultaneous." It does say</p> <p>11 "simultaneously coupled when switching," if</p> <p>12 that's what you mean.</p> <p>13 Q. And there -- is there a distinction</p> <p>14 between simultaneously coupling and the process</p> <p>15 that's described in the abstract of Burrows,</p> <p>16 Exhibit 8?</p> <p>17 A. Simultaneous coupling would mean that</p> <p>18 they occur at a similar time. Burrows</p> <p>19 describes that as a sufficient time period. So</p> <p>20 it would depend on your translation.</p> <p>21 Simultaneous doesn't have to mean instantly; it</p> <p>22 just means you ask for the engagement at the</p> <p>23 same time. It depends on your control scheme</p> <p>24 what you do with that afterwards.</p> <p>25 Q. So it's your opinion that the sort of</p>	<p style="text-align: right;">Page 199</p> <p>1 S. Becker</p> <p>2 two-step process that Burrows outlines for kind</p> <p>3 of spinning up the auxiliary driveline could be</p> <p>4 contemplated by Burrows -- by Teraoka?</p> <p>5 A. Teraoka doesn't specifically mention</p> <p>6 it or not mention it. You know, it's not</p> <p>7 discussed. They just say we're going to ask</p> <p>8 for the couplings to engage.</p> <p>9 As soon as they make this product and</p> <p>10 they do that, they would see a driveline clunk</p> <p>11 most likely as the commanded application of</p> <p>12 torque.</p> <p>13 If it's applied too quickly, you're</p> <p>14 going to get a clunk. If you apply it with a</p> <p>15 sufficient time period, you're going to</p> <p>16 eliminate that clunk.</p> <p>17 Q. Can one readily substitute this</p> <p>18 two-stage kind of synchronization process</p> <p>19 that's described in Burrows, Exhibit 8, into</p> <p>20 Teraoka?</p> <p>21 A. Definitely. I would expect that if</p> <p>22 you were ever to have not seen Burrows and were</p> <p>23 to attempt to implement Teraoka, you would --</p> <p>24 you would do that.</p> <p>25 Q. Based on what?</p>
<p style="text-align: right;">Page 200</p> <p>1 S. Becker</p> <p>2 A. Based on relevant skill in the art.</p> <p>3 Again, the performance characteristics of the</p> <p>4 driveline are such that you're going to</p> <p>5 minimize NVH-type systems, noise, vibration and</p> <p>6 harshness.</p> <p>7 A rapid application of torque to a</p> <p>8 shaft that's not spinning in connecting to a</p> <p>9 shaft that's spinning at, say, any given</p> <p>10 highway speed or other speed would cause a</p> <p>11 significant jerk. Jerk is a sudden</p> <p>12 acceleration of the driveline. That jerk would</p> <p>13 be translated to decrease durability and</p> <p>14 increased harshness.</p> <p>15 Q. And is the trade-offs associated with</p> <p>16 jerks more pronounced for an ATV than for a</p> <p>17 conventional vehicle?</p> <p>18 A. Not specifically. Again, it goes</p> <p>19 back to your definition of ATV.</p> <p>20 In England, they keep defining ATV as</p> <p>21 a Land Rover or a vehicle that can go off-road.</p> <p>22 Here in the U.S., we define ATV as an off-road,</p> <p>23 you know, generally smaller-looking vehicle.</p> <p>24 Also a UTV.</p> <p>25 Q. So for an off-road vehicle, let's say</p>	<p style="text-align: right;">Page 201</p> <p>1 S. Becker</p> <p>2 if we use that terminology, if we equate</p> <p>3 all-terrain and off-road vehicle --</p> <p>4 A. Well, I can't --</p> <p>5 Q. -- would one expect acceleration</p> <p>6 jerks to be greater with an off-road vehicle?</p> <p>7 A. You're going to be using a lower mass</p> <p>8 drive system so the jerk itself would be less,</p> <p>9 but because the vehicle itself also weighs</p> <p>10 less, the effect of that jerk may be the same.</p> <p>11 In other words, mass provides a</p> <p>12 damping for jerk. In a vehicle that's massive,</p> <p>13 having a larger weight system being jerked is</p> <p>14 going to dampen that jerk greater than a</p> <p>15 lightweight vehicle. So if you were comparing,</p> <p>16 say, a -- like, a Land Rover Discovery and</p> <p>17 you're going to jerk that drive lane --</p> <p>18 driveline compared to, say, a Yamaha Rhino</p> <p>19 because of the ridged connections in the Yamaha</p> <p>20 and the lighter weight of the whole vehicle,</p> <p>21 the effect of spinning up that driveline should</p> <p>22 be pretty similar. But again, that would have</p> <p>23 to be tested. And that would be normal</p> <p>24 development.</p> <p>25 MS. SHAH: Give me two minutes,</p>

<div>Page 202</div> <div> <p>1 S. Becker</p> <p>2 then we may wrap up.</p> <p>3 (Recess taken.)</p> <p>4 MS. SHAH: So I have no further</p> <p>5 questions.</p> <p>6 MS. MANDRUSIAK: We have no</p> <p>7 redirect at this time. We will reserve</p> <p>8 the right to read and sign the</p> <p>9 transcript when it's done.</p> <p>10 MS. SHAH: Okay. Thank you very</p> <p>11 much.</p> <p>12</p> <p>13 (Deposition adjourned at 3:43 p.m.)</p> <p>14</p> <p>15</p> <p>16</p> <p>17</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> </div>	<div>Page 203</div> <div> <p>1 S. Becker</p> <p>2 C E R T I F I C A T E</p> <p>3 COMMONWEALTH OF VIRGINIA:</p> <p>4 I, MARY ANN PAYONK, shorthand reporter,</p> <p>5 do hereby certify that the witness whose</p> <p>6 deposition is hereinbefore set forth was duly</p> <p>7 sworn, and that such deposition is a true,</p> <p>8 correct, and full record of the testimony</p> <p>9 given.</p> <p>10 I further certify that I am not related</p> <p>11 to any of the parties to this action by blood</p> <p>12 or by marriage, and that I am in no way</p> <p>13 interested in the outcome of this matter.</p> <p>14 IN WITNESS WHEREOF, I have hereunto set</p> <p>15 my hand this 14th day of June, 2016.</p> <p>16</p> <p>17</p> <p>18 MARY ANN PAYONK, Shorthand Reporter</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> </div>
<div>Page 204</div> <div> <p>1 S. Becker</p> <p>2 - INDEX TO WITNESSES -</p> <p>3 WITNESS PAGE</p> <p>4 STEVEN J. BECKER</p> <p>5 Examination by Ms. Shah 4</p> <p>6 - EXHIBITS -</p> <p>7 NO. DESCRIPTION MARKED</p> <p>8 Exhibit No. 1 Biography printout 17</p> <p>9 Exhibit No. 2 SAE paper 79</p> <p>10 Exhibit No. 3 '440 patent 120</p> <p>11 Exhibit No. 4 Becker declaration 124</p> <p>12 Exhibit No. 5 Teraoka reference 147</p> <p>13 Exhibit No. 6 Watanabe reference 173</p> <p>14 Exhibit No. 7 Petition 189</p> <p>15 Exhibit No. 8 Burrows patent 194</p> <p>16</p> <p>17 ***</p> <p>18</p> <p>19</p> <p>20</p> <p>21</p> <p>22</p> <p>23</p> <p>24</p> <p>25</p> </div>	<div>Page 205</div> <div> <p>1 S. Becker</p> <p>2 NAME OF CASE:</p> <p>3 DATE OF DEPOSITION:</p> <p>4 1. To clarify the record.</p> <p>5 2. To conform to the facts.</p> <p>6 3. To correct transcription error.</p> <p>7 Page _____ Line _____ Reason _____</p> <p>8 From _____ to _____</p> <p>9 Page _____ Line _____ Reason _____</p> <p>10 From _____ to _____</p> <p>11 Page _____ Line _____ Reason _____</p> <p>12 From _____ to _____</p> <p>13 Page _____ Line _____ Reason _____</p> <p>14 From _____ to _____</p> <p>15 Page _____ Line _____ Reason _____</p> <p>16 From _____ to _____</p> <p>17 Page _____ Line _____ Reason _____</p> <p>18 From _____ to _____</p> <p>19</p> <p>20</p> <p>21 SUBSCRIBED AND SWORN TO BEFORE ME</p> <p>22 THIS _____ DAY OF _____, 2016.</p> <p>23</p> <p>24 (Notary Public)</p> <p>25 My Commission expires: _____</p> </div>