UNITED STATES PATENT AND TRADEMARK OFFICE

_____

BEFORE THE PATENT TRIAL AND APPEAL BOARD

_____

SZ DJI TECHNOLOGY CO., LTD.,

Petitioner,

v.

AUTEL ROBOTICS USA LLC,

Patent Owner.

Alfred Ducharme
July 13, 2020

_____

Case IPR2019-00846

Patent 9,260,184

The discovery teleconference deposition of ALFRED DUCHARME, called by the Patent Owner, for examination, pursuant to

U.S. LEGAL SUPPORT
www.uslegalsupport.com

notice, taken remotely before LAURA MUKAHIRN, CSR, RPR, CRR, within and for the County of Cook and State of Illinois, on July 13, 2020, scheduled to commence at 8:00 o'clock a.m. CST.

A P P E A R A N C E S:

KING & SPALDING, LLP
BY: MR. STEVEN PETERS
speters@kslaw.com
1700 Pennsylvania Avenue NW
2nd Floor
Washington, D.C. 20006
(202)737-0500
Appeared on behalf of the Petitioner;

STEPTOE & JOHNSON LLP
BY: MR. JOHN L. ABRAMIC
jabramic@steptoe.com
227 West Monroe Street
Suite 4700
Chicago, Illinois 60606
(312)577-1300
Appeared on behalf of the Patent Owner.

I N D E X

E X H I B I T S

THE COURT REPORTER: The attorneys participating in this deposition acknowledge that I am not physically present in the deposition room and that I will be reporting this deposition remotely. They further acknowledge that, in lieu of an oath administered in person, the witness will verbally declare his testimony in this matter is under penalty of perjury. The parties and their counsel consent to this arrangement and waive any objections to this manner of reporting. Please indicate your agreement by stating your name and your agreement on the record.

MR. ABRAMIC: This is John Abramic on behalf of patent owner. I agree.

MR. PETERS: Steven Peters on behalf of petitioner, I agree.

(Witness sworn.)

DR. ALFRED DUCHARME,

called as a witness herein, having been first duly sworn, was examined and testified as follows:

Examination

By Mr. Abramic

Q. Good morning, Dr. Ducharme.
A. Good morning.
Q. Could you please state and spell your name for the record?
A. Sure. It's -- First and last?
Q. Yes, please.
A. Alfred, A-L-F-R E-D; Ducharme, D-U-C-H-A-R-M-E.
Q. Thank you. And have you been deposed before, Dr. Ducharme?
A. I have.
Q. Okay. So I'll spare you the ground rules. The only thing I'll ask is if you don't understand a question, just let me know, and I will try my best to rephrase so we have a mutual understanding. Is that all right?
A. Okay.
Q. If you need a break, just let me know. This is not going to be an endurance contest.
A. Okay.
Q. And it's my understanding that you have submitted three declarations in this proceeding. Does that sound correct to you?
A. Yes.

Page 6

Q. I am going to try to give you access to those three declarations right now.
A. Okay.
Q. And Steven did this successfully last time, so the pressure is on me.
So your first declaration should have popped up Exhibit 1003. Did you receive that?
A. Yes. I'm just going to take a moment to make a folder.
Q. Sure. No problem.
A. Okay.
Q. And your next two also should have been sent over. The second one is Exhibit 1028 and the third is Exhibit 1030.
(Whereupon, Dr. Ducharme Deposition Exhibit Nos. 1003, 1028, and 1030 were remotely introduced and provided electronically to the reporter.)

THE WITNESS: I knew I should have grabbed a second monitor. I can do that in a little while.

Page 7

BY MR. ABRAMIC:
Q. Well, I can share the screen here to have it pop up on the screen. Just let me know when you've received those. The main reason I'm doing this is to make sure the court reporter and Steve have access to them.

A. Yes. I have received them and downloaded them, and I'm ready to open them if need be.
Q. Okay. I'm going to start with your first declaration, which is Exhibit 1003, and I'm going to pull it up here on the screen, I believe.
A. And I can see it, just to let you know.
Q. Okay. Thank you. So we're looking at the first page of Exhibit 1003. Do you see that, Dr. Ducharme?
A. I do.
Q. And does that appear to be the first page of your first declaration that you submitted in this proceeding?
A. It does appear to be the first declaration.
Q. Okay. And all I want you to do at this point is confirm that this document, indeed, is your first declaration. And you can look at as much of it as you want. You may want to open the version that I sent you. But for your convenience, I'll pull it down to the final page on the screen here.
For some reason it looks like -- there we go. The screen share doesn't appear to be working all that well. Would you mind opening Exhibit 1003 that I sent to you?

Page 8

A. I opened Exhibit 1003. I'm looking through it now. It does appear to be my first declaration.
Q. Okay. Thank you. And then on Page 80, that's your signature; is that right?
A. Yes.
Q. Okay. And then let's do the same exercise with the next two declarations. First we'll start with Exhibit 0128.
A. Yeah. For some reason I'm just having a little trouble with the files. Hold on. I'm opening 1028 now. I'm looking at it, looking through very briefly, just going through it to refresh my recollection of that particular declaration.

Page 9

Q. Sure. Take your time.
A. Yes. I believe Exhibit 1028 that you delivered to me is my second declaration.
Q. And that's your signature on Page 31 of that document?
A. It is.
Q. Okay. Thank you. And let's do the same thing with Exhibit 1030.
A. Okay. I have opened Exhibit 1030 that you delivered to me. Yes. And I believe that is my declaration. Exhibit 1030 is my third declaration.
Q. Thank you. And then your signature is on Page 23 of that document?
A. That's correct.
Q. Okay. Thank you. And I would like to start with some questions about Exhibit 1003. So if you could go to that document and turn to Paragraph 64.
A. I'm at Paragraph 64 of Exhibit 1003. Can I pause for a moment? I want to grab a mouse because scrolling is -- I realize I'm going to need to do that a lot.

Page 10

Q. Absolutely.
A. Can we hold just for one moment?
Oh, you probably heard that. I let my wife know that the -- I thought it was going great. And I need a piece of paper.
Okay. I'm at Paragraph 64.
Q. Thank you. And if you take a look at Paragraph 64, would you agree that in this paragraph you are describing conventional threaded screw mechanisms for attaching UAV rotor blades?
MR. PETERS: Object to form.
THE WITNESS: Taking that paragraph alone, I agree it's describing typical threaded screws. There is nothing in that paragraph about UAVs.
BY MR. ABRAMIC:
Q. Okay. But there are -- It's your understanding that UAVs in the prior art have used conventional threaded screw-type connection mechanisms for connecting rotor blades, correct?
A. I'm sorry. Can you repeat the question?
Q. Sure. You're familiar with the fact that UAVs, some UAVs, use conventional threaded

Page 11

screw connection mechanisms for fastening rotor blades, right?
A. That is correct. Yes.
Q. And you're familiar with the Sasaki reference; is that right?
A. I am.
Q. And Sasaki is one of the references on which you base your opinions in this case; is that right?
A. Yes. That's correct.
Q. And you would agree that Sasaki discloses a quadrotor UAV that uses a threaded screw connection mechanism for the rotor blades?
A. Can you share that reference with me?
Q. Sure. I have just sent you Exhibit No. 1006.
(Whereupon, Dr. Ducharme Deposition Exhibit No. 1006 was remotely introduced and provided electronically to the reporter.)
THE WITNESS: Okay. And then I'm sorry to ask, but can you then repeat the question?

Page 12

BY MR. ABRAMIC:
Q. Sure. Well, why don't I first establish that this is the actual Sasaki reference that you're familiar with. So take a look at Exhibit 1006. And it's my understanding that this document is an English translation of the Sasaki reference upon which you have based your opinions. Could you please take a look at that document and confirm that that is, indeed, the translation of the Sasaki reference?
A. Yes. This -- What you delivered to me is -- Exhibit 1006 is the reference that I used in my declaration, the one that I'm familiar with.
Q. Thank you. So the question I have is whether or not Sasaki discloses a quad rotor that utilized a conventional threaded screw mechanism for attaching rotor blades?
A. Yes.
Q. And if we go back to Paragraph 64 of Exhibit 1003, is that description of conventional screw mechanisms consistent with your understanding of the threaded screw mechanism disclosed in Sasaki?

Page 13

A. Yes.
Q. So when a quad rotor uses a conventional threaded mechanism for attaching the propeller blades, the clockwise spinning driveshafts have a different thread direction than the counterclockwise spinning driveshafts, correct?
A. Yes.
Q. And so in that instance two of the driveshafts will have right-handed threads and two will have left-handed threads, right?
A. I believe so. If you -- yeah. It gets confusing as to which is right-handed. I believe that's correct.
Q. And you would agree that on a quad rotor that has a conventional threaded screw mechanism for attaching the propeller blades, that it is possible to screw a left-handed threaded propeller blade onto a right-hand threaded driveshaft?
MR. PETERS: Objection. Incomplete hypothetical.
THE WITNESS: I'm sorry. Could you either repeat the question, or are you changing it now?

Page 14

BY MR. ABRAMIC:
Q. No. I'll repeat the question. So would you agree that on a quad rotor that uses a conventional threaded screw mechanism for attaching the propeller blades, that it is possible to screw a left-hand threaded propeller blade onto a right-hand threaded driveshaft?
MR. PETERS: Same objection.
THE WITNESS: No.
BY MR. ABRAMIC:
Q. So you're saying it's impossible to do it?
MR. PETERS: Mischaracterizes.
THE WITNESS: You have to -- You have to define the bounds of what you consider to be -- I'm sorry. Can you repeat the first part of the question? I want to make sure I use the same term that you did.
BY MR. ABRAMIC:

Q. Sure. Would you agree that on a quad rotor that has a conventional threaded screw mechanism for attaching the propeller blades, that it is possible to screw a left-hand threaded propeller blade onto a right-hand

Page 15

threaded driveshaft?
A. Okay. I believe that you could take a right-hand threaded propeller and damage it by engaging the threads on a left-hand threaded shaft. Is it possible to get that propeller

onto the shaft? Not without damage or deformation or cross-threading, as I talked about in my declaration.
Q. Okay. But with that damage or deformation that you're talking about, it is possible to get it on the shaft, correct?
MR. PETERS: Objection. Incomplete hypothetical.
THE WITNESS: I really haven't -- yeah. I really have no idea, because you're not defining the kind of materials that you're using. I can give an example. If you have one very hard material -- say the shaft -- and one very soft material -- say the propeller -- then it would be possible to damage the threads and, you know, mount that propeller onto the shaft.
If you -- In another example, if you had two very hard materials, say two very hard materials that it would be difficult for a

Page 16

typical man or woman to damage by mere hand pressure, then I don't believe it would be possible to screw that propeller onto that shaft. So it is highly material dependent, tool dependent, or person dependent as to whether or not it's possible.
BY MR. ABRAMIC:
Q. Can we go to Exhibit 1028, and this is your second declaration. Take your time.
A. Yep. I'm there.
Q. Okay. Bear with me one second.
A. I'm going to see if I can split screen. It's a little difficult to look at the exhibit while watching you, so it's -- I'm going to try to get them both on the same screen here.
Q. If you go to Paragraph 49 of your second declaration.
A. Okay.
Q. And the second sentence of that paragraph states: Specifically, Dr. Reinholtz provides a video of himself forcing a blade from a UAV apparently utilizing a conventional screw-on attachment mechanism onto the wrong driveshaft. Do you see that?

Page 17

A. Yes.
Q. And in that sentence are you describing a video that Dr. Reinholtz made of himself screwing -- what I'll call misthreading a blade, putting a blade on the wrong driveshaft?
A. Yes.
Q. And you reviewed that video?
A. Yes.
Q. And is it your opinion that that video depicts a scenario that you had just described where it is possible to misinstall a threaded propeller onto a driveshaft?
A. Yes.
Q. Okay. And then if you look further on down in Paragraph 49, there's a sentence that starts with, "When a blade is forced"?
A. Yes.
Q. And that states: When a blade is forced onto the driveshaft and the threads are stripped, the blade is not and cannot be engaged with the locked mechanism.
And then the next sentence says: Rather, the metal threads on the shaft lock portion are likely carving out new notches in the blade lock

Page 18

portion. Correct?
A. Yes.
Q. And so that second sentence that I just read where it says, "The metal threads on the shaft lock portion are likely carving out new notches in the blade lock portion," is that a description of what you believe occurred when Dr. Reinholtz misthreaded the blade in the video?
A. Well, as I said in my declaration, I believe it's likely.
Q. Okay. And so what -- I guess what I'm trying to understand are what are the other possible scenarios? Is it possible that new notches were not carved out and the blade was attached by some other mechanism?
A. Are you referring specifically to the video? What possibly could have occurred in the video besides a carving out?

Q. Sure. Yeah. One possibility, based on your declaration here, is that the threads carved out new notches in the blade lock portion. What are the other possible explanations, if there are any?

Page 19

A. The only other -- The only scenario, in general, is that the notches and lugs, you know, the threads, are not engaged. There may be other ways that that propeller got onto that shaft, but all of the ways that I can conceive of, the threads are not engaged. The threads that were present on the propeller and on the shaft before the attachment was attempted are damaged. So I could -- yeah.

Q. So, in your opinion, the threads had to have been damaged in order to attach the blade?
A. I really don't know. As I've said in my declaration, it -- what occurs is very -- it relates very specifically to the materials that were used and the pitch of the thread, you know. Yeah. I'll leave it at that.
Q. If we assume that the threads in the video, the prop threads were plastic and the shaft threads were metal, is it possible that instead of there being a carving out -- as you say in your declaration -- that the softer threads on the prop shaft were deformed during the rotating onto the driveshaft?
A. I really don't know. It depends on the

Page 20

types of materials and the thread used. And that video, you know, it didn't really go into that detail, so.
Q. Okay. Well, let's take the instance that you described when you -- and the instance that I'm thinking of is the instance where Dr. Reinholtz misthreaded a blade. And let's assume that what happened is what you've described in your declaration here as the threads on the shaft lock portion carved out new notches in the blade lock portion. Can we proceed based on that assumption?
A. Okay.
Q. And so in that instance where Dr. Reinholtz demonstrated misthreading a blade, you would at least agree that the blade is engaged in the lock mechanism, correct?
A. I believe in this case the notches and lugs are the threads, and they're not engaged.
Q. Okay. So it's your opinion that when a blade is misthreaded, like Dr. Reinholtz demonstrated in his video, that that blade is not engaged in the lock mechanism, right?
A. Yes.

Page 21

Q. Okay. And what is your understanding of the word "engaged" in the context of the '184 patent?
A. I'm going to go ahead and refer to my declaration here. I'm just scrolling up to the engagement limitation.
Q. Sure.
A. Yeah. I mean my understanding of the engagement limitation comes from Claim 1, "Wherein the clockwise rotor blade is engageable only with the clockwise lock mechanism and cannot be engaged in the clockwise -- counterclockwise lock mechanism, and the counterclockwise rotor blade is engageable only with the counterclockwise lock mechanism and cannot be engaged in the clockwise lock mechanism." I believe the plain and ordinary reading of that Claim No. 1 is the engagement limitation.
Q. Okay. But I'm not asking about the engagement limitation. I'm asking about the word "engage." What is your understanding of the plain and ordinary meaning of the word "engage" in the context of the '184 patent?

Page 22

A. Hold on one second. Let me just review for a second.
Q. Sure.
A. I guess I would describe -- I would describe engagement as the meeting of two interlocking mechanical parts.
Q. Let's go back to the scenario that we were talking about where a blade is misthreaded, and, as you've described, the metal threads are carving out new notches in the plastic threads, that scenario. Can we talk about that?
A. Yes. Sure.
Q. In that instance, the threads -- Well, in that instance, what's holding the propeller blade onto the driveshaft?
A. I don't know. I didn't physically, you know, interact with that plastic propeller and that shaft, so I don't -- I don't know -- I don't know.
Q. Okay. Well --
A. I could hypothetically create a situation where I could imagine it, but is that what you'd like me to do?
Q. Yes, please.

Page 23

A. If you were to take a soft plastic propeller and misthread it onto a shaft, it's really just the forces of deformation of the softer material on the harder material.
Q. Okay. And so when you -- You misthread the propeller blade and it's attached -- meaning you can't pull it off -- what forces are keeping you from being able to pull that blade off?
A. Well, as I've described in the declaration, in the event that new notches had been carved out, the -- you know, the new forces -- well, let me take -- Let me start again.
So in the case of the carved-out threads, it's really the pressure of the sides of the blade how, you know -- the mechanical construct around where the hole for the threads are, that material is pushing against the shaft. The carving out can be a removal of material, or it could be a -- I'm trying to think of the right word -- like a bending of the material.
Q. Okay. And so --
A. And the force is -- The force is just the pressure of the housing pushing against the

Page 24

shaft.
Q. Okay. And so there is going to be interaction in that instance between the threads of the shaft and the threads of the blade, right?
A. Yes. I'm sorry. There's -- please repeat that. Because you said an interaction between the threads and the shaft and the threads in the blade, correct?
Q. Correct.
A. And in this instance, depending on the pitch, the size of the threads, I have no idea what that interaction is. So what I described as a cross-threading or a crossing of those, that would be the interaction.
Q. You had talked about the engagement limitation response to one of the previous questions, and you had gone to your declaration, one of your declarations. I want to ask you about the engagement limitation, but I just want to make sure I'm on the same page with you. Which declaration did you turn to for that?
A. I believe I was just reading Claim 1. So it could have been from any of them. But I

Page 25

was specifically reading from Exhibit 1028. It just happened to be the one that was open.
Q. Let's go to Exhibit 1030, if you would.
A. Okay. I'm there.
Q. And if you would go to Paragraph 23.
A. Yes.
Q. Would you agree that Paragraph 23 recites the engagement limitation?
A. It recites Claim 1 in Paragraph 23.
Q. Well, Paragraph 23 is not the entirety of the Claim 1, correct? That's just the engagement limitation?
A. Yeah. That's correct, yes. It's an excerpt in Claim 1.
Q. And the excerpt is what the parties have been referring to as the engagement limitation. Is that your understanding?
A. That is my understanding, yes.
Q. So in the context of the engagement limitation, for a rotor blade to be engageable with a lock mechanism, do lugs have to be engageable with notches?
MR. PETERS: Object to scope. Calls for a legal conclusion.

Page 26

THE WITNESS: Yeah. I really don't know how to answer that question. I'm sorry.
BY MR. ABRAMIC:
Q. Do all UAV blade connection mechanisms have to use lugs and notches?
MR. PETERS: Objection. Calls for speculation.
THE WITNESS: I really don't know the answer to that question either.
BY MR. ABRAMIC:
Q. Can you think of a UAV blade connection mechanism that does not use lugs and notches?
A. I'm trying to think. I've seen a lot of propellers in the last ten years. Yes.
Q. And what are you thinking of?
A. Similarly to the micro drones reference that we use, there are some UAVs that utilize an elastic, elastomeric-type like rubber band or what's referred to as an O-ring to hold the propeller on to the driveshaft with the -- without the lugs and notches.
Q. Okay. So -- Thank you very much. That's a good example for us to use.
So let's imagine a UAV that uses

Page 27

O-rings to connect the rotor blades, and it does not use lugs and notches. And now imagine that the O-rings were designed somehow such that the clockwise rotor blades were installed using one type of O-ring and counterclockwise O-rings -- I'm sorry -- counterclockwise rotor blades were installed with some other type of O-ring. This is just a hypothetical scenario.
A. Okay.
Q. But that the clockwise rotor blades could only be attached to clockwise driveshafts and vice versa. Do you understand that hypothetical?
A. Well, "can only be" requires someone, you know, looking at it and making the determination, right? There's nothing mechanically that makes that decision in your hypothetical, if I'm understanding it correctly.
Q. In the hypothetical, there -- I can't describe the exact design of the O-ring, but the O-rings, there are two different types of O-rings: one for clockwise rotor blades, one for counterclockwise rotor blades. And the specific design of the O-rings ensures that the

Page 28

clockwise rotor blades can only be fastened to the clockwise driveshafts, and the counterclockwise rotor blades can only be fastened to the counterclockwise driveshafts. Do you understand that hypothetical?
A. Not really, because I can't -- I can't envision -- because it's a hypothetical, I can't really envision exactly what makes that determination. For example, let's just say that you said that the clockwise O-rings were green and counterclockwise O-rings were red. That doesn't make a mechanical determination. Someone has to look at it. In that example that I just used of red and green O-rings is typically -- I mean for a long time, that's -- that's how people assured that they were getting the correct propellers on the correct motors was colors.
Q. Yeah. But in that instance, a color difference wouldn't prevent the installation of the wrong blade, right?
A. That's absolutely correct.
Q. Okay. And what I'm asking you is to envision a scenario where the specific design of

Page 29

the O-ring for some reason did prevent installation of the wrong blade. Are you saying you just can't -- You can't imagine that scenario?
A. Yeah. For some reason it needs to be defined a little bit more for me to give an opinion on it. I mean I can -- honestly I can't -- I was going to say that I could think of some reason and then -- but I really can't. I can't envision what would be special about an O-ring.
Q. All right. Well, then let's try a different hypothetical. Let's assume a connection mechanism that doesn't use O-rings but uses magnets.
A. Okay.
Q. Okay. So can you imagine a connection mechanism where a rotor blade was connected to the driveshaft somehow with magnetic force where there was no lugs and notches involved?
A. I'll accept the hypothetical. I can't personally envision it.
Q. Okay. So accepting the hypothetical --
A. And I say that -- I say that just

Page 30

because that particular example that you use has very limited attraction force. So I -- you know, as an engineer, I have difficulty with it.

Q. I understand. I understand. But let's assume you have enough attraction force to attach the blade using the magnets.

A. Okay.

Q. You use one polarity for the clockwise lock mechanism, another polarity for the counterclockwise lock mechanism, such that you can't attach a clockwise blade to a counter-clockwise driveshaft. Do you understand that?

A. Okay. I do.

Q. In that instance, would the rotor blade be engageable only with the clockwise lock mechanism in the context of the engagement limitation?

MR. PETERS: Object to scope. Calls for speculation.

THE WITNESS: Yeah. If you could -- I would need to understand mechanically where these magnets were. If the magnets are protruding and fitting into grooves in the motor then, you

Page 31

know, that's a notch and a lug. So I --

BY MR. ABRAMIC:

Q. No. That --

A. I can't answer based on what I know of the example.

Q. Sure. So the hypothetical has no lugs and notches in the connection mechanism. That's -- And that's the point I'm trying to get at, which is whether or not the engagement limitation requires the engagement of lugs and notches. So in this hypothetical, there are no lugs and notches that assist in the connecting of the blade to the driveshaft. It's merely magnetic forces. And the only reason we're doing the hypothetical is so I can get your understanding of whether or not the engagement limitation requires the engagement of lugs and notches. So in that instance, the one we just described -- a hypothetical blade connection mechanism that used magnetic forces where there are no lugs and notches where a clockwise rotor blade cannot be attached to a counterclockwise driveshaft -- would the clockwise rotor blade be engageable only with the clockwise lock

Page 32

mechanism in the context of the engagement limitation?

MR. PETERS: Same objections.

THE WITNESS: I don't believe so.

BY MR. ABRAMIC:

Q. And is that because it's your understanding that the engagement limitation requires the engagement of lugs and notches?

A. Yes.

Q. Can we turn to Exhibit 1003, your first declaration?

A. Yes. I'm there.

Q. Thank you. And I'm looking at Paragraph 45.

A. Okay. I'm there at 45.

Q. Thank you. And at the end of Paragraph 45, there's a sentence that says: The well-understood concept drove manufacturers of commercial UAVs to "mistake proof" the coupling between the propeller assembly and the driveshaft to ensure users attached the propellers to the correct driveshaft.

Do you see that?

A. Yes.

Page 33

Q. And by mistake proofing, you mean that manufacturers of commercial UAVs wanted to devise systems that would prevent attaching the wrong blades in the way that Dr. Reinholtz attached the wrong blade in his video, right?

A. Yes.

Q. When you say in this sentence that "the well-understood concept drove manufacturers of commercial UAVs to mistake proof," that -- when you say "the well-understood concept," what concept are you referring to? Isn't it the fact that if you put the wrong blade on, you're going to generate a down force as opposed to a vertical force?

A. Yeah. I mean the sentence before that is -- you know, would not be controllable if the -- if a motor had an incorrect propeller.

Q. How long were people of skill in the art aware of that concept? How far back, I guess -- I'm sorry. How far back would you say people of skill in the art were aware of that concept?

A. Since the very first multi-rotor aircraft. One of the tenets of flight for a

Page 34

quadcopter or a multi-rotor copter is that some of the propellers spin one way and some of the propellers spin the other way, and that's to counteract the off force. So when you're putting one of these kinds of aircraft together, you have to make sure the right propellers go on the right motors. There's other concepts downstream as well. You have to make sure that the motor is spinning in the correct direction, you have to make sure that the flight controller knows where that motor is. It's a lot of details. But if the flight controller doesn't know the rotations of all the motors, then it can't control its flight, it can't control its attitude. So since the very first aircraft.

Q. Can you put a date on that? I won't hold -- I know it's going to be an approximation, but.

A. 2010.

Q. And so it's your understanding that 2010 is the first time that a quad rotor aerial vehicle was made?

A. No. It was a bit before that date, but it was very sparse. And it wasn't until 2010

Page 35

that commercial flight controllers were available to build these crafts. So I really think of the start of multi-rotor aircraft as being, you know, the prevalence, I'll say, 2010.

Q. Okay. Could you go to Sasaki. That's Exhibit 1006.

A. Yes. I'm there.

Q. And on the second page of that exhibit, which is the first page of the patent, do you see that there's an application date, May 31, 1989?

A. Yes.

Q. And the publication date of January 14 of 1991. Do you see that?

A. I do, yep. Mm-hmm.

Q. And Sasaki, as we already discussed, discloses a quadrotor UAV, right?

A. Yes.

Q. And early on it talks about a propeller for a flying toy. Do you see that?

A. Yes.

Q. Okay. So quadrotor UAVs were around long before 2010, correct?

A. They are in the art, yes.

Page 36

Q. When you say "they are in the art," are you saying that they existed only on paper as of, for example, 1991?

A. I really don't know. Well, I know that they existed on paper, but I really don't know when physical realizations were, you know, available. That's why I mentioned the date of 2010, because that was really when you first started to see these, you know, numerous people using them. I realize in the art there's this toy from Sasaki and -- but the question was when did people -- when did I believe this concept was -- well, I really believe, you know, it's -- the concept of having the correct propeller on the correct motor was something that -- was -- I'm trying to say this the right way here -- was something that was realized when quadcopters became prevalent. That's what I'm trying to say.

Q. So you're saying at the time of Sasaki, a person of skill in the art of UAVs would not have had an understanding of the need for attaching the correct blades on the correct driveshafts?

Page 37

A. You know what, I -- referring to my declaration, I really was considering a person of skill -- having ordinary skill in the art around the timeframe of 2013. So I really -- I didn't render an opinion really on what person of skill -- a POSITA would have had in 1989 or 1991.

Q. Okay. But I'm asking you for that opinion right now.

A. I think that the inventors on this patent understood, because they detail it in their patent, that there was an importance for having counter-rotating propellers and that they would require different attachment mechanisms. So I believe that at least these three people, the three people -- two people had this knowledge, but I don't know how many other people had that knowledge at that time. Maybe it doesn't matter. I guess these people understood that there was an importance.

Q. So you then said when we talked about the concept that drove people to mistake proof, this well-understood concept that putting the wrong blade on the wrong driveshaft will

Page 38

generate the wrong -- or thrust in the wrong direction or lift in the wrong direction, right?
A. Yes.
Q. And you had mentioned that that concept would have been well understood by a person of skill in the art dating back to the first time that someone made a flying quadrotor, right?
A. That's true. I did say that.
Q. And do you have an understanding as to when the first quadrotor vehicle that you can imagine was made?
A. Do I know?
Q. Yes.
A. I mean -- yeah. Hold on one second. I'm on the internet, if that's okay. I just can't remember the person's name. Maybe it doesn't really matter. I just am trying to be correct. It was the turn of the century. It was a Frenchman, L'Obertain (ph.), I believe his name is. I mean it's very old, the first quadcopter. There were counter-rotating propellers, as I understand. There's very little information on it. I guess my answer should be: A long time ago.

Page 39

Q. Can you go to Exhibit 1028?
A. Okay. I'm there.
Q. Paragraph 42.
A. Okay.
Q. And in the last sentence of that paragraph you're talking about the -- what I'll call is the quick-turn connection mechanism. So it's your understanding that the currently pending proposed amended claims include a limitation requiring the rotation of the blade to be less than a full revolution; is that correct?
A. I'm going to refer to my third declaration, just because I know that I have the amended claims there.
Q. Sure.
A. And they've changed enough that it's confusing now, so.
Yeah. It's bipartial rotation.
Q. Okay. And then if you go back to Paragraph 42 of Exhibit 1028.
A. Okay.
Q. You're talking here about a proposed combination of Sasaki and Sokn improving

Page 40

usability because, quote, a user can assemble and disassemble the propellers with only a half turn as compared with three to four turns.
Do you see that?
A. Yes.
Q. And so the reference to three to four turns is a reference to the conventional threaded connection mechanisms we were talking about earlier that are described in Sasaki where you have to spin the propeller blade several revolutions onto the shaft to get it connected, right?
A. Yes.
Q. And this reference to only one half turn is a reference to the fact that, in your proposed combination of Sasaki and Sokn, you would not have to rotate the blade a full revolution. It would only be a half turn, right?
A. Yes.
Q. And that difference, you were saying, improves usability, right?
A. It has improved mechanical alignment.
Q. Right. And it also says --

Page 41

A. And improved usability. That's correct.
Q. Okay. Why does it improve usability?
A. It's just quicker for a user to put a propeller on a shaft.
Q. So it's more convenient, right? You just pop it on there really quick instead of spinning it around the shaft?
MR. PETERS: Object to form.
THE WITNESS: Yes.
BY MR. ABRAMIC:
Q. Was there a need in the UAV industry at the time of the '184 patent invention to improve usability of blade connection mechanisms?
MR. PETERS: Object to form.
THE WITNESS: What was the date that you said? 2013?
BY MR. ABRAMIC:
Q. Yeah. At the time of the inventions of the '184 patent.
A. Yes. Actually, can I strike that? I don't know if I can strike that.
Before I say yes or no, can you define "need"?

Page 42

Q. Did people in the industry think that that feature, improving that feature, mattered?
MR. PETERS: Object to form. Calls for speculation.
THE WITNESS: I think in general people want to make things easier to use.
BY MR. ABRAMIC:
Q. So in your opinion was there a need for improving usability in the UAV industry at the time of the '184 patent invention?
A. I really don't know if there was a need for it.
MR. PETERS: Excuse me. I'm sorry for interrupting, but can you guys hear me?
MR. ABRAMIC: Yes.
MR. PETERS: Okay. John, I lost your audio for the last question, but I have the transcript so I think we can continue.
MR. ABRAMIC: Okay. We've been going about an hour; why don't we take a 10-minute break.
THE WITNESS: Okay.
(Short break taken.)
BY MR. ABRAMIC:
Q. Dr. Ducharme, I want to turn back to

Page 43

one of your answers. We were talking about the advent of UAVs, and you had mentioned that you viewed 2010 as sort of the start of the prevalence of UAVs. And you made a reference to commercial flight controllers. Could you explain to me why you view 2010 as the start of the prevalence of UAVs?
A. Yeah. I mean it's partly because of my history. So I started my company in 2010, and we made commercial flight controllers. So, you know, when we had the idea for making these things, these flight controllers, there wasn't anywhere to go to really see. There was some projects, but there were -- there weren't really quadcopters or hexocopters or octocopters around. So in my mind it asked -- I tend to give the answer of 2010 because that's really where it all started for me, but that's when I saw, over the next couple of years from 2010, the -- you know, the prevalence of UAVs, whereas you really didn't see it before then. And I realize in the art it predates that. But it was maybe a bit of an off-the-hip answer, but in my mind, the whole world of UAVs started in 2010

Page 44

when I started my company, so.
Q. Do you make a distinction in your mind between what today we might call a drone and what Sasaki called a flying toy?
A. Yeah, a bit. It has more to do with the intelligence on board. So toys tend to be controlled by a user, or they just fly around randomly. I have a bunch of these little toys. But a drone or -- what really everybody says is a UAV, classifies as an unmanned aerial vehicle -- is on demand and a bit autonomous. So I tend to think of UAVs as being these smart devices.
Q. So you wouldn't include flying toys under the description of UAVs?
A. Well, I don't know. I don't -- Let me just refer to my declaration and see if I made any comments on that.
I mean I do refer to Sasaki as his UAV. There's a level of abstraction I think here that goes back and forth. UAV is any aircraft -- in this case defined as a body with four arms extending, you know, with motors and propellers -- and we call that a UAV in this

Page 45

context.
Q. Okay. Thanks. I'm going to show -- attempt to share another exhibit with you.
(Whereupon, Dr. Ducharme Deposition Exhibit No. 2010 was remotely introduced and provided electronically to the reporter.)
BY MR. ABRAMIC:
Q. Okay. I sent what is marked as Exhibit 2010. Let me know when you get that one.
A. Okay. I have that on my screen.
Q. And if we look at the first page of Exhibit 2010. First of all, it's a little bit confusing because there are two exhibit numbers. But I'm referring to the one that's on the bottom left. Do you see where it says Exhibit 2010?
A. Yes. On the bottom, you're saying bottom left.
Q. I'm sorry. Bottom right.
A. Yeah. I see a 2009, and then below that a 2010.

Page 46

Q. Okay. And then the first page of this document states that it's an expert report of Dr. Juan J. Alonso. Do you see that?
A. Yes.
Q. Do you know Dr. Alonso?
A. The same sounds familiar, but I don't know if I know him.
Q. You've never spoken with Dr. Alonso?
A. I really couldn't say. I -- I don't remember doing so, but if I search through my e-mails -- if he's in the UAV industry, there's a chance I probably talked to him, but I don't recall.
Q. Do you have an understanding that Dr. Alonso was DJI's expert at an International Trade Commission proceeding that related, at least in part, to the '184 patent?
A. I -- not really, no.
Q. Okay. Well, I will represent to you that this is an expert report from Dr. Alonso submitted in an International Trade Commission proceeding where the '184 patent was at issue. Dr. Alonso was DJI's expert. And if I said this was the expert report, I should clarify and say

Page 47

it's just excerpts. But if you go to Page 3 of that document, and you may have to rotate the view to see it.
A. Yes. I've rotated it.
Q. Okay. And in the second full paragraph in that table there on Page 3 of the exhibit, there's a sentence that starts with, "In general." Do you see that?
A. I do.
Q. And do you see that there's a reference to Sasaki in that sentence?
A. I see the word Sasaki, yes.
Q. I'm going to read that sentence. It states: In general a POSITA would have understood the need to overcome the limitations of Sasaki to ensure simpler, more reliable, less error-prone, and faster ways of attaching and detaching the propellers of a UAV.
Do you see that statement?
A. I do.
Q. Do you think that that statement is accurate?
MR. PETERS: Object to form.
THE WITNESS: I really have no idea. I

Page 48

haven't read this disclosure. "In general a POSITA would have understood the need." I see -- I understand the sentence. I believe it's correct. When he says "understood the need," I don't know exactly what need he's referring to or if that's -- or if it's more -- it should be more of a desire, "would have understood the desire to overcome the limitations." I mean "desire" being a little less strong. "Need" seems to imply that you have to. "In order to fly UAV you have to overcome these limitations," and that's maybe not completely true.
BY MR. ABRAMIC:
Q. Okay. So let's -- Dr. Alonso identifies a number of, what he calls, limitations of Sasaki in this sentence. Let's break it down to make it easier. One of the limitations he refers to, the language he uses is "less error prone." Do you see that?
A. No. We're both looking at Appendix A2, still, right?
Q. Yes. And it's the same sentence that I just read.

Page 49

A. Oh, less error prone. Yeah. I'm sorry. I was looking below it, and I couldn't find -- I was looking for the word prone. Okay. Yes. And what was the question again? I apologize.
Q. I was -- I wanted to direct you to acknowledge that you see that Dr. Alonso has identified that as a limitation in Sasaki.
A. Yes.
Q. And would you agree that a person of ordinary skill in the art, when viewing Sasaki, would have recognized a desire to come up with a less error-prone connection mechanism?
A. Not necessarily. It really depends on the materials that are used.
Q. So it's your opinion that there was not a need to come up with a design that was less error prone than Sasaki?
MR. PETERS: Object to form.
THE WITNESS: Yeah. I mean it really depends on the materials, as I said in my declaration. And I say that because the industry used, you know, counter-threaded shafts and propellers for a long time, and it met the need and

Page 50

satisfied -- the propellers and motors being less error prone. I mean they weren't error prone. Unless you forced a soft material onto a harder material and damaged the propeller or the shaft, it wasn't a problem. I mean if they're both, prop and shaft, made of hard materials -- and there's plenty of UAVs that still utilize this technique -- you can't put the wrong propeller on the wrong motor. It's not error prone.

BY MR. ABRAMIC:

Q. So you're saying the design in Sasaki is not error prone at all?

A. I'm saying that it's not error prone given the correct materials.

Q. What are the correct materials -- Is it error prone in the event that you have metal threads on the driveshaft and plastic threads on the propeller blade?

MR. PETERS: Objection. Calls for speculation.

THE WITNESS: Yeah. It really -- you'd really need to define the materials better. There are some very hard plastics.

Page 51

BY MR. ABRAMIC:

Q. Using any materials that you can come up with, is it your opinion that Sasaki was not error prone at all?

MR. PETERS: Objection. Form.

THE WITNESS: It could be error prone if the -- if incorrect materials were used.

BY MR. ABRAMIC:

Q. And so you would agree then that there would have been a desire to make the design in Sasaki less error prone, correct?

A. Well, no, because it requires more explanation than that. I don't think there's a desire to make Sasaki less error prone unless the wrong materials are used.

Q. Okay. So there is -- There was no need to make Sasaki less error prone at the time of the invention of the '184 patent; is that correct?

A. That's correct. But -- Well, I'll leave it at "that's correct." There was no desire to make it less error prone. I mean it's undefinable because I -- go on.

Q. Looking at the revised amended claims,

Page 52

we talked already about one particular feature, which I called the quick twist, and that is this concept of connecting the propeller blade by rotating less than a full revolution, right?

A. Yes.

Q. And then you would also agree that the revised amended claims include the other feature of mistake proofing, right?

MR. PETERS: Object to form.

THE WITNESS: Can you just give me a moment? Yeah. And mistake proofing is considered to be the wrong propeller on the wrong motor. So I would say yes.

BY MR. ABRAMIC:

Q. Okay. So thinking about those two particular features, I want to try to get a sense of your understanding of the UAV market and the current state of the UAV market and which drones have those features. So are you familiar with the -- with current drones that are on the market?

A. Yes.

Q. And so can you think of a DJI drone that has those two features: quick twist and

Page 53

mistake proofing?

MR. PETERS: Object to --

THE WITNESS: I'd have to --

MR. PETERS: Object to scope and calls for speculation.

THE WITNESS: I can think of lots of different propellers. It really -- I mean things change so quickly in the market. If you can present a picture to me, I could give an opinion on if I thought it met those requirements.

BY MR. ABRAMIC:

Q. Okay. And so you can't think of any off the top of your head that has those features?

MR. PETERS: Object to scope.

THE WITNESS: No, I can't.

BY MR. ABRAMIC:

Q. And during the course of your investigation in this proceeding, did you seek out any information from DJI about the number of their products that have those features versus the number that don't?

A. I don't recall doing that.

Page 54

Q. Did you do any independent investigation on your own to determine that?
A. I think since the case started, I maybe looked at propellers more closely because it was on my mind. I did do some research after watching Dr. Reinholtz's video where he puts the propeller incorrectly onto a DJI aircraft. And I did do some research on that to determine that it was a problem that people were having where they were damaging the threads of the propellers by forcibly attaching them, as Dr. Reinholtz did in his video. And I think that's all I did.
Q. Sure. And when you say that you did some research after watching that video that confirmed what Dr. Reinholtz demonstrated, what research was that? Was it like YouTube videos or something like that?
A. I think I just did a general Google search for, you know, problems, misthreading propellers, maybe those search terms, something like that. I don't recall exactly. I don't believe I -- I didn't document it, but.
Q. Did you attempt to misthread a propeller blade that utilized a threaded

Page 55

connection to try to recreate what Dr. Reinholtz had done?
A. No. Specifically in an attempt to recreate what happened in the video?
Q. Right.
A. Or what I saw in the video? No.
Q. Do you own any drones?
A. Yes.
Q. What drones do you own?
A. Well, I -- I own all the drones. I guess you could say that the ones I have been flying lately are, you know, hand built -- I guess you could say -- go with flight controllers and motors and propellers, built from scratch. It's sort of -- they're production units for my company from the past, but ones that I built, because we built all the drones. So I'm not sure that's the answer you were looking for.
Q. You --
A. I don't own a DJI drone.
Q. You do not own a DJI drone?
A. No.
Q. Do you own any drones that have a

Page 56

conventional threaded-type connection for the propeller blade?
A. That's a good question. I'll say yes.
MR. ABRAMIC: Okay. Steve, I have no further questions.
MR. PETERS: All right. Can I take about 15 minutes and be back on the record at about 10:50?
MR. ABRAMIC: Sure.
MR. PETERS: Thank you.
(Short break taken.)
Examination
By Mr. Peters
Q. Dr. Ducharme, do you recall Mr. Abramic asking you about a hypothetical where blades are attached to a driveshaft using magnets?
A. Yes.
Q. Do you recall answering that the magnet hypothetical would not meet the engagement limitation?
A. Yes.
Q. Do you recall answering that the reason that the magnetic hypothetical would not meet the engagement limitation was because the

Page 57

engagement limitation requires engagement of lugs and notches?
A. Yes.
Q. All right. Can you turn to Page 67 of Exhibit 1003?
A. Yes.
Q. Do you see portion of Claim 1 on this page?
A. Exhibit 1003?
Q. Yes.
A. Paragraph 67?
Q. Page 67.
A. I'm sorry. I'm on Page 67.
Q. And do you see the Claim 1 limitations on this page?
A. I do.
Q. Which limitation -- or do any limitations on this page require engagement of lugs and notches?
A. No.
Q. So which limitations are the engagement limitation on this page?
A. 1H. Hold on one second. 1G and 1H.
Q. And in 1I do you -- Is there any

Page 58

recitation of lugs and notches in 1I?
A. Yeah. I forgot about that part. Yes. The -- it indicates that the shaft lock portion defining notches configured to engage corresponding to lugs in the blade lock portion.
Q. So would you like to expand on your previous answer to the question of whether the engagement limitation requires engagement of lugs and notches?
A. Yeah. The engagement limitation, Claim 1, 1G and 1H as it's shown on Exhibit 103 on Page 67, does not include locks and notches -- I'm sorry -- lugs and notches.
Q. So when Mr. Abramic asked you about whether the magnetic hypothetical would not meet the engagement limitation because engagement limitation requires engagement of lugs and notches, why did you answer yes to that question?

A. I was incorrect at that moment. I was thinking of just the word "engage" and thinking of mechanical parts fitting together and knowing that the magnetic hypothetical, which wasn't well defined, would need something sticking out

Page 59

and something that it would go into, like a lug and a notch. And so I was thinking it didn't meet the entire definition of Claim 1, but it meets -- it does engage only with -- the clockwise only engages with the clockwise rotor and vice versa for counterclockwise. It does engage those because it fits together only with those. I guess I should add: And, therefore, meets the engagement limitation.

Q. I have no further questions.
MR. ABRAMIC: I have a couple of questions.

Re-Examination

By Mr. Abramic

Q. Dr. Ducharme, prior to Mr. Peters' questioning today, did you confer with him at all?
A. Yes.
Q. And did that occur over the most recent break prior to his questioning?
A. Yes.
Q. And was that a phone call you had?
A. Yes.
Q. And did you generally discuss the questions and answers that would occur during

Page 60

his questioning?
MR. PETERS: Objection. Privileged. Instruct the witness not to answer.
MR. ABRAMIC: I'm not asking for the substance of any of the communications. I'm just asking if the subject matter of the questioning was discussed.
MR. PETERS: Same objection. Instruct the witness not to answer.
BY MR. ABRAMIC:
Q. What did you do to prepare for your deposition today, Dr. Ducharme?
A. I reviewed the exhibits that were used in my declaration and -- declarations, and read through my declarations.
Q. And did you confer with counsel?
A. I talked to counsel. We had phone meetings, okay.
Q. Okay. No more questions. Thank you, Doctor.

(Witness excused.)

* * * * * *

Page 61

STATE OF ILLINOIS)
) SS.
COUNTY OF COOK)

I, LAURA MUKAHIRN, Certified Shorthand Reporter and Notary Public in and for the County of Cook, State of Illinois, do hereby certify that on July 13, 2020, the deposition of the witness, ALFRED DUCHARME, called by the Patent Owner, was taken before me, reported stenographically, and was thereafter reduced to typewriting under my direction.
The said deposition was taken remotely, and there were present counsel as previously set forth.
The said witness, ALFRED DUCHARME, was first duly sworn to tell the truth, the whole truth, and nothing but the truth, and was then examined upon oral interrogatories.
I further certify that the foregoing is a true, accurate, and complete record of the questions asked of and answers made by the said witness, ALFRED DUCHARME, at the time and place hereinabove referred to.
The undersigned is not interested in

the within case, nor of kin or counsel to any of the parties.

Witness my official signature in and for the County of Cook, State of Illinois, on this 15th day of July A.D., 2020.

LAURA MUKAHIRN, CSR, RPR, CRR
CSR NO. 084-003592