IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

NORTHWESTERN UNIVERSITY,	)	
	)	
Plaintiff,	)	
	)	
v.	)	C.A. No. 21-150 (CFC)
	)	
ABB LTD and ABB INC.,	)	**JURY TRIAL DEMANDED**
	)	
Defendants.	)	

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

1. Plaintiff Northwestern University brings this action for infringement of U.S. Patent Numbers 6,907,317, 6,928,336, and 7,120,508 (collectively the "patents at issue"), which claim groundbreaking intelligent assist systems in the field of collaborative robotics. Northwestern demands a trial by jury on all issues so triable and, for its complaint against defendants ABB Ltd and ABB Inc. (collectively the "ABB Defendants"), alleges as follows:

THE PARTIES

2. Northwestern is a private, not-for-profit institution of higher education and research organized and existing under the laws of Illinois, with a principal place of business at 633 Clark Street, Evanston, Illinois, 60208. Northwestern is the owner and assignee of the patents at issue.

3. On information and belief, Defendant ABB Ltd is a Swiss corporation with a principal place of business at Affolternstrasse 44, 8050 Zurich, Switzerland.

4. On information and belief, Defendant ABB Inc. is a Delaware corporation with a principal place of business at 305 Gregson Dr., Cary, North Carolina, 27511.

5. On information and belief, Defendant ABB Inc. is a wholly owned subsidiary of ABB Ltd.

JURISDICTION AND VENUE

6. This lawsuit is an action for patent infringement arising under the patent laws of the United States, Title 35, of the United States Code.

7. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

8. ABB Ltd is subject to jurisdiction in the United States, and specifically in Delaware, under Fed. R. Civ. P. 4(k)(2). ABB Ltd has contacts with the United States that include, *inter alia*, advertising, offering to sell, and/or selling their products and software throughout the United States, including in this District.

9. This Court has personal jurisdiction over ABB Inc. because, among other things, ABB Inc. is a Delaware corporation that, having availed itself of Delaware's corporate laws, is subject to personal jurisdiction in Delaware.

10. This Court has personal jurisdiction over both ABB Defendants in that they have, directly or through their agents and/or intermediaries, committed acts within Delaware giving rise to this action and/or have established minimum contacts with Delaware such that the exercise of jurisdiction would not offend traditional notions of fair play and justice.

11. In particular, on information and belief, the ABB Defendants, directly and/or through their agents and/or intermediaries, make, use, import, offer for sale, sell, and/or advertise their products and affiliated services in Delaware.

12. Further, on information and belief, the ABB Defendants have placed, and continue to place, infringing products into the stream of commerce, via an established distribution channel, with the knowledge and/or understanding that such products are sold in the United States, including in Delaware.

13. On information and belief, the ABB Defendants have derived substantial revenue from their infringing activity occurring in Delaware and within this District and/or should reasonably expect their actions to have consequences in Delaware.

14. Venue over ABB Ltd is proper in the District of Delaware under 28 U.S.C. §§ 1391 and 1400(b) because ABB Ltd is not resident in the United States and may thus be sued in any judicial district.

15. Venue over ABB Inc. is proper in the District of Delaware under 28 U.S.C. § 1400(b) because ABB Inc. is deemed to reside in this District because it is incorporated under the laws of the State of Delaware.

BACKGROUND

I. Northwestern University

16. Northwestern is a world-renowned research university that fosters and creates important progress in engineering and applied science. Each year, Northwestern is ranked as one of the most innovative universities in the U.S. and in the world.

17. Northwestern is home to nearly 1,500 research laboratories across two campuses in the Chicago area. Northwestern's research laboratories are at the cutting edge of research in many fields, including medicine, biomedical research, engineering, materials and industrial processes, software, and therapeutics.

18. Much of the research at Northwestern, like the research that led to the patents at issue in this case, requires significant funding, and is financed by various public and private sources. The knowledge obtained through Northwestern's research benefits many people and organizations around the world, including educators, researchers, employers, employees, and consumers.

19. To maximize those benefits, Northwestern sometimes patents and/or commercializes inventions made by its faculty and researchers, and then returns a portion of the proceeds of those activities to fund further education and research at the University.

20. Over the past 15 years, the United States Patent and Trademark Office has awarded hundreds of patents to Northwestern, recognizing the many discoveries made by its faculty and staff. These patents span numerous fields and disciplines. Many are based on groundbreaking research done at Northwestern's Robert R. McCormick School of Engineering and Applied Science.

21. Established in 1909, the McCormick School of Engineering is one of twelve constituent schools at Northwestern. The McCormick School of Engineering offers Doctor of Philosophy (Ph.D.) and Master of Science (M.S.) programs and houses some of the nation's top researchers and brightest students. There are more than 207 full-time faculty on staff at the McCormick School of Engineering, which budgets more than $1.5 billion a year for its research efforts and currently ranks fourth in the United States in industrial manufacturing and systems engineering, according to U.S. News & World Report.

22. One of the faculty members at the McCormick School of Engineering is Dr. Michael A. Peshkin, who is a Professor of Mechanical Engineering and Breed Senior Professor of Design. Dr. Peshkin is also a fellow of the National Academy of Inventors and a recipient of a number of teaching and educator awards.

23. Dr. Peshkin is a frequent collaborator with Dr. J. Edward Colgate. Dr. Colgate is also a Professor of Mechanical Engineering at the McCormick School of Engineering and the recipient of numerous awards and recognitions in the field of mechanical engineering.

24. Drs. Peshkin and Colgate are the inventors on a broad class of intelligent assist devices known as collaborative robots or "cobots." Cobots are programmable robotic manipulators and assist devices that can safely interact with human operators in a shared workspace. Prior to the invention of the cobot in the laboratory of Drs. Peshkin and Colgate, the word "cobot" did not exist. Now, according to the Wall Street Journal, the word is one "you'll need to know" for the "glossary of the future."

II. Cobots

25. Drs. Peshkin and Colgate presented the first academic paper on cobots at the Proceedings of the IEEE International Conference on Robotics and Automation in April of 1996. The paper, titled "Nonholonomic Haptic Display," won the Best Conference Paper award.

26. The first patent applications covering first-generation cobots were filed in 1996 and 1997 and resulted in the issuance of United States Patent Nos. 5,923,139 and 5,952,796, respectively.

27. First-generation cobots were passive devices that assured safe human-robot interactions by having no internal source of motive power and more limited range of motion, accomplished through the use of nonholonomic joints and transmission elements that created programmable constraints.

28. Drs. Peshkin and Colgate, along with others, developed a second generation of intelligent assist devices. Unlike first-generation cobots, these computer-controlled devices could be either active or passive, and used sophisticated sensors, controls, and motor technology to allow human operators to position loads with greater degrees of freedom, speed, precision, and ease. And importantly, these new devices contained a modular architecture of programmable components coordinated through digital communication links that allowed for the creation of bespoke intelligent assist devices able to adapt to a variety of applications.

29. Work on these second-generation intelligent assist devices is protected by numerous United States patents, including the patents at issue in this case.

30. The patents at issue, U.S. Patent Nos. 6,928,336, 6,907,317, and 7,120,508, disclose an architecture, configuration system, and multi-functional hub for intelligent assist systems. These patents are attached as Exhibits 1-3.

31. Intelligent assist devices are a class of computer-controlled machines that interact with a human operator to assist in various tasks, including moving objects (or payloads). That assistance to a human operator may take various forms, such as supporting the weight of the object, helping the operator overcome frictional forces, helping the operator guide or direct the motion of the object, or moving the object itself.

32. At the time of the invention of the asserted patents, intelligent assist devices were considered to be a new development in technology. Although intelligent assist devices included some robotic characteristics, intelligent assist devices were not considered to be the same as industrial robots. In particular, intelligent assist devices were deemed considerably different from other equipment and machines, such as industrial robots, because they allow people to be in the proximity of the device while the device is operating.

33. The safety considerations for intelligent assist device were distinct from industrial robots. For example, industrial robots, which are not in active operation while humans are in their immediate vicinity, would include safety cages to prevent humans from inadvertently coming near the robot. But such a safety solution is antithetical to intelligent assist devices, as such cages would prevent the human interactions and collaborations that intelligent assist devices are specifically designed and intended to perform.

34. Intelligent assist devices also operate differently compared to how two or more humans working together would approach the problem of moving objects. For example, two human workers may discuss and formulate a plan for moving an object and then execute that plan while verbally communicating. One worker may be able to tell that the other needs a break from visual or auditory cues and can then suggest that they both put the object down. Human workers perceive their environments through subjective sensory processing. In contrast, an intelligent assist device "communicates" with a human operator through, for example, computer componentry that does not function in the same way as the human brain. An intelligent assist device must be able to do more than simply "communicate" with the operator through a user interface (i.e., by receiving direct inputs from the operator). For example, it could also employ sensors that allow the intelligent assist device to understand the forces that the operator is supplying or sensors allowing it to understand the position of the operator relative to the device. However, the range of sensing features was not well developed in prior art intelligent assist devices.

35. It was well appreciated at the time of the invention that the problem of creating intelligent assist devices that could operate effectively and safely in a collaborative way with humans was not trivial. It was not a matter, for example, of simply taking tasks that had previously been done by humans and automating those tasks. Rather, an intelligent assist device required sophisticated componentry, programming, and implementation to allow the machine to take over some portions of a task while also allowing the human operator to remain in the workspace of the intelligent assist device and collaborate with it.

36. Moreover, at the time the asserted patents were filed, the field of intelligent assist devices, while exciting, was in its infancy. The intelligent assist devices that did exist were somewhat primitive. For example, early intelligent assist devices suffered from limitations such as

movement in only two dimensions, the capacity to undergo a single type of motion, or the ability to perform only one type of task.

37. The inventions of the asserted patents were improvements over the intelligent assist devices that existed at the time. While previous intelligent assist devices were "intelligent"—in that they could sense forces being supplied by the human operator and amplify that movement—the prior devices were limited in their application. For example, prior devices were passive devices that were not integrated into a factory system or working environment. Instead, they were largely prototypes that could perform a single task or motion. The claim inventions overcame those limitations.

38. The inventions improved on those prior devices by, for example, incorporating a novel modular architecture. The claimed modular architecture includes a variety of modules, in which each individual moving component can be independently controlled but which is also integrated into a larger system that may be controlled centrally. At the time of the invention, such distributed control was unknown for intelligent assist devices. The asserted patents' novel modular architecture came with significant advantages, including efficiency gains from minimizing the need for central control of every joint and moving piece while still having a system in communication to globally handle the overall task assigned to the system.

39. In addition to (and in part because of) this novel modular architecture, the intelligent assist systems of the asserted patents have improved safety features over the prior art. The asserted patents incorporate novel intent sensors that can be used to predict and measure the operator's expected actions. Prior devices were limited to the user affirmatively inputting data about their intentions (e.g., through a graphical or other user interface) or to detecting the forces that the operator was supplying. In contrast, the inventions of the asserted patents use readings

from sensors, like intent sensors, to make predictions about the operator's actions in real time (including understanding where the operator is and will be and a number of other predictive measures) and adjust the system's movements accordingly. These specialty sensors are critical for the intelligent assist device to be able to operate safely around humans, as they allow the system both to predict human movement and to react quickly to the operator being in an unexpected position. For example, certain sensors enable the system to stop movement as soon as the device comes into unexpected contact with the operator or another human in the area.

40. The patents at issue are the result of the work of all named inventors on intelligent assist systems with a modular architecture. The importance of these contributions to the design and creation of intelligent assist systems, as disclosed and claimed in the '336, '317, and '508 patents, was widely recognized in the engineering community, including by industrial robotics manufacturers such as the ABB Defendants, whose products incorporate Northwestern's innovations.

41. Northwestern has complied with the requirements of 35 U.S.C. § 287(a). Since issuance of the asserted patents, the patentees did not make, offer for sale, or sell in the United States any article covered by the asserted patents, or import into the United States any article covered by the asserted patents.

III. The ABB Defendants' Infringing Products

42. ABB Ltd is a multi-national manufacturer of industrial robots and solutions for factory automation that conducts business throughout the world through a number of subsidiaries, including ABB Inc. in the Unites States.

43. On information and belief, ABB Ltd conducts business in the United States through its wholly owned subsidiary, ABB Inc.

44. Collectively, the ABB Defendants design, develop, manufacture, market, and sell industrial robots intended to be used in collaboration with humans, including but not limited to IRB 1100, IRB 120, IRB 1200, IRB 1300, IRB 140, IRB 140T, IRB 1600, IRB 2600, IRB 14000, IRB 14050, IRB 460, IRB 4600, IRB 660, IRB 760, IRB 7600, and IRB 8700 systems and arms; the IRC5, IRC5C, and OmniCore controllers, and the FlexPendant and Teach Pendant user interfaces (the "Accused Products"). The Accused Products include these robotic arms, accompanying control box, and/or teach pendant, alone or in combination.

45. On information and belief, each of the accused ABB products contains a robotic arm, control box, and teach pendant, a multi-function hub used by the human operator to interact with, program, and control the robot, among other functions.

46. On information and belief, the ABB Defendants began commercial marketing of the Accused Products on the following dates:

a. IRB 1100 in 2018;

b. IRB 120 in 2009;

c. IRB 1200 in 2014;

d. IRB 1300 in 2020;

e. IRB 140 in 2002;

f. IRB 1600 in 2007;

g. IRB 2600 in 2010;

h. IRB 14000 in 2015;

i. IRB 14050 in 2018;

j. IRB 460 in 2011;

k. IRB 660 in 2004;

l. IRB 4600 in 2008;

m. IRB 760 in 2011;

n. IRB 7600 in 2002;

o. IRB 8700 in 2015;

p. FlexPendants in 2006;

q. Teach Pendants in 2006;

r. IRC5 controllers in 2007;

s. IRC5C controllers in 2010; and

t. OmniCore controllers in 2018.

47. The ABB Defendants are involved in the sale and/or importation of cobot systems into the United States, including but not limited to the systems and architecture for providing modular intelligent assist systems and hubs for modular intelligent assist systems. The ABB Defendants' cobot systems embody and/or use the patented systems, configuration systems, and multi-function hub at issue in this case.

48. On information and belief, the ABB Defendants designed, developed, made, and sold infringing cobot systems despite having knowledge of the Northwestern patents at issue by virtue of its receipt of a letter from Northwestern's counsel notifying the ABB Defendants of their infringing conduct.

FIRST CAUSE OF ACTION

(Infringement of the '336 Patent)

49. Northwestern incorporates by reference its allegations in Paragraphs 1-38 as if fully restated herein.

50. On August 9, 2005, the United States Patent and Trademark Office lawfully issued the '336 patent, entitled "System and Architecture for Providing a Modular Intelligent Assist

System." All rights, title, and interest in and to the '336 patent have been assigned to Northwestern, which is the sole owner of the '336 patent.

51. The '336 patent is valid and enforceable. The invention of the '336 patent addressed concerns specific to cobots—the need for natural and intuitive control of a payload by a human operator through easy and safe interactions with a powered robot. The '336 patent improved on the first generation of cobots by, among other things, claiming a novel modular architecture for a cobot that allows for wide flexibility and variability.

52. The ABB Defendants have directly, literally under 35 U.S.C. § 271(a) and/or equivalently under the doctrine of equivalents, infringed the '336 patent, by making, using, selling, and/or offering to sell in the United States, and/or importing into the United States, without license or authority, the Accused Products.

53. The Accused Products meet each and every element of one or more claims of the '336 patent. By way of illustration only, the ABB Defendants' Accused Products meet each and every element of claim 1 of the '336 patent.

54. Independent claim 1 of the '336 patent recites:

> An intelligent assist system having a modular architecture, comprising:
>
> a motion module for supporting and moving a payload;
>
> a plurality of computational nodes, at least one of the plurality of computational nodes being configured to control the motion module; and
>
> a plurality of communication links, at least one of the plurality of communication links being between two of the plurality of computational nodes to carry information between the nodes to actuate the motion module.

55. As depicted below and described on the ABB Defendants' Robotics website, the ABB Defendants describe the Accused Products as intelligent assist systems. For example, they describe the IRB 14000 YuMi cobot as "a flexible and safe automation solution for tasks where

robot need to work close to human." collaborative . . . assembly robot solution" designed to be "active agents" that work "side-by-side with humans" in a safe way. Similarly, the ABB Defendants describe the IRB 14050 YuMi cobot as having "best-in-class safety design," which "facilitates fenceless operation" in collaboration with humans. Notably, the ABB Defendants market these robots as having unique and "superior safety," making them "perfect for close Cooperation."

YuMi is the first truly collaborative dual armed robot, designed for a world in which humans and robots work together. It heralds a new era of robotic co-workers which are able to work side-by-side on the same tasks as humans with extreme accuracy while ensuring the safety of those around it.

See, e.g., YuMIi IRB 14000 Data Sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-14000-yumi (last visited January 28, 2021) (Exhibit 4).

56. The ABB Defendants also highlight ABB's SafeMove robotic safety solution, which integrates into the IRC5 and OmniCore controllers to "make ABB's other industrial robots also work collaboratively."

Collaboration

With SafeMove the tools to facilitate collaboration between man and machine are a reality. For example, if an operator needs to interact with the robot system, safety sensors can be incorporated into the robot cell to detect the person's presence. After detected, SafeMove with either supervise the robot's speed or monitor it while it is standing still. Once the person clears the zone, the robot can resume operation. The end result is less down time and increased productivity.

See, e.g., Technical data for SafeMove, available at https://new.abb.com/products/robotics/controllers/irc5/irc5-options/safemove (last visited January 28, 2021) (Exhibit 5).

57. The ABB Defendants' Accused Products have a modular architecture comprising at least one articulated robot arm, a controller, and a user interface, such as the FlexPendant, as depicted below. This architecture allows for customization and rapid update of software to allow greater flexibility, user-friendliness, and additional automation of the intelligent assist device.

IRB 1100:

See, e.g., IRB 1100 presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-1100 (last visited January 28, 2021) (Exhibit 6).

58. In the ABB Defendants' Accused Products, the articulated robot arm comprises a motion module, or alternatively is comprised of multiple motion modules, each of which contain at least one actuator. The robot arm can support and move a payload, as described below from the ABB Defendants' Robotics website.

IRB 120:

See, e.g., IRB 120 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-120 (last visited January 28, 2021) (Exhibit 7).

IRB 1200:

See, e.g., IRB 1200 presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-1200 (last visited January 28, 2021) (Exhibit 8).

IRB 1300:

See, e.g., Small Robot Update: IRB 1300 Introduction, available at https://new.abb.com/products/robotics/industrial-robots/irb-1300 (last visited January 28, 2021) (Exhibit 9).

IRB 140:

Compact and very powerful. The IRB 140 six axes multipurpose industrial robot handles a payload of 6 kg with a reach of 810 mm (to axis 5) It can be floor mounted, inverted or wall mounted at any angle. The robust design with fully integrated cables adds to the overall flexibility and the collision detection function ensures the robot is reliable and safe.

See, e.g., IRB 140 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-140 (last visited January 28, 2021) (Exhibit 10).

IRB 140T:

See, e.g, IRB 140, available at https://new.abb.com/products/robotics/industrial-robots/irb-140 (last visited January 28, 2021) (Exhibit 11).

IRB 1600:

See, e.g., IRB 1600 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-1600 (last visited January 28, 2021) (Exhibit 12).

IRB 2600:

See, e.g., IRB 2600 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-2600 (last visited January 28, 2021) (Exhibit 13).

IRB 14000:

See, e.g., YuMi – IRB 14000 presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-14000-yumi (last visited January 28, 2021) (Exhibit 14).

IRB 14050:

See, e.g., IRB14050 Single-Arm YuMi presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-14050-single-arm-yumi (last visited January 28, 2021) (Exhibit 15).

IRB 460:

See, e.g., IRB 460 presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-460 (last visited January 28, 2021) (Exhibit 16).

IRB 4600:

See, e.g., IRB 4600 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-4600 (last visited January 28, 2021) (Exhibit 17).

IRB 660:

See, e.g., IRB 660 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-660 (last visited January 28, 2021) (Exhibit 18).

IRB 760:

See, e.g., IPR 760 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-760/irb-760-data (last visited January 28, 2021) (Exhibit 19).

IRB 7600:

See, e.g., IRB 7600 data sheet, available at https://new.abb.com/products/robotics/industrial-robots/irb-7600 (last visited January 28, 2021) (Exhibit 20).

IRB 8700:

See, e.g., IRB 8700 presentation, available at https://new.abb.com/products/robotics/industrial-robots/irb-8700 (last visited January 28, 2021) (Exhibit 21).

59. On information and belief, the articulated robot arm, the controller, and the pendant of the ABB Defendants' Accused Products each contain one or more computational nodes. At least one of the computational nodes is configured to control the articulated robot arm. The computational nodes further comprise a programmable logic device and can execute motion control algorithms, including automatic motion control algorithms.

60. On information and belief, there are communication links between the computational node(s) of the controller, teaching pendant, and/or human-machine interface and the robot arm, including at least one node that actuates the motion module.

61. On information and belief, the ABB Defendants' Accused Products also include various sensors that are embedded in the articulated robot arm. Each sensor is itself a computational node. Examples of such sensors include vision and force sensors.

> If YuMi senses an unexpected impact or change in its environment such as a collision with a coworker, it can pause its motion within milliseconds to prevent injury, and the motion can be restarted again as easily as pressing play on a remote control.

See, e.g., Exhibit 4.

62. On information and belief, the computational nodes on the ABB Defendants' Accused Products are connected by a plurality of communication links. At least one of the communication links carries information between the nodes to actuate the articulated robot arm.

63. In violation of 35 U.S.C. § 271(b), the ABB Defendants have been and are indirectly infringing the '336 patent by inducing infringement of this patent by others who use the ABB Defendants' Accused Products.

64. The ABB Defendants' affirmative acts of making, selling, and offering to sell its services and/or products, or components thereof, cause the ABB Defendants' Accused Products to be used in a manner that infringes the '336 patent.

65. The ABB Defendants further provide guidance and instruction to third parties to use the Accused Products in their normal and customary way to infringe the '336 patent.

66. The ABB Defendants specifically intend that its customers infringe the '336 patent. The ABB Defendants perform the acts that constitute induced infringement with knowledge of the '336 patent and with knowledge or willful blindness that the induced acts would constitute infringement.

67. In violation of 35 U.S.C. § 271(c), the ABB Defendants have been and are indirectly infringing the ’336 patent by contributing to the infringement of this patent by others, such as the ABB Defendants’ customers, in the United States.

68. The ABB Defendants offered to sell and have sold in the United States, and imported into the United States, the Accused Products, which are a material part of the invention of the ’336 patent. The ABB Defendants know that the Accused Products (i.e., a robotic arm, control box, and/or teach pendant, alone or in combination are especially made or especially adapted for an infringing use, and not a staple article or commodity of commerce suitable for substantial non-infringing use.

69. The ABB Defendants have had actual notice of the ’336 patent no later than May 5, 2020, when counsel for Northwestern sent the ABB Defendants a letter identifying the ’336 patent and Accused Products that infringe the ’336 patent.

70. The ABB Defendants willfully infringe the ’336 patent by deliberately engaging in acts of infringement on an ongoing basis with knowledge of the ’336 patent.

SECOND CAUSE OF ACTION

(Infringement of the ’317 Patent)

71. Northwestern incorporates by reference its allegations in Paragraphs 1-60 as if fully restated herein.

72. On June 14, 2005, the United States Patent and Trademark Office issued the ’317 patent, entitled “Hub for a Modular Intelligent Assist System.” All rights, title, and interest in and to the ’317 patent have been assigned to Northwestern, which is the sole owner of the ’317 patent.

73. The ’317 patent is valid and enforceable. The invention of the ’336 patent addressed concerns specific to cobots—the need for natural and intuitive control of a payload by a human operator through easy and safe interactions with a powered robot. The ’317 patent improves on the

first generation of cobots by, among other things, claiming a hub for an intelligent assist system, which controls the systems and helps impart wider flexibility and variability.

74. The ABB Defendants have directly, literally under 35 U.S.C. § 271(a), and/or equivalently under the doctrine of equivalents, infringed the '317 patent, by making, using, selling, and/or offering to sell in the United States, and/or importing into the United States, without license or authority, the Accused Products.

75. The Accused Products meet each and every element of one or more claims of the '317 patent. By way of illustration only, the ABB Defendants' Accused Products meet each and every element of claim 1 of the '317 patent.

76. Independent claim 1 of the '317 patent recites:

> A multi-function hub for use in an intelligent assist system, the multi-function hub comprising:
>
> a physical interface configured and arranged to be a central interface point for an operator;
>
> a computational node disposed on the physical interface, the computational node comprising programmable logic for implementing program controlled functions; and
>
> an input/output ("I/O") interface for interfacing with an information network and disposed on the physical interface, the I/O interface being adapted to communicate with the computational node on the physical interface and at least one computational node disposed on the other module via a common data link, and the I/O interface uses a digital communication protocol to communicate with the computational node on the other module via the common data link.

77. On information and belief and as depicted below, the ABB Defendants make, use, and sell several multi-function hubs with a physical interface for use with the Accused Products, including but not limited to the following controllers and pendants: the IRC5, IRC5C, and OmniCore controllers, and the FlexPendant and Teach Pendant user interfaces.

FlexPendant:

See, e.g., IRC5 Industrial Robot Controller data sheet, available at https://new.abb.com/products/robotics/controllers/irc5 (last visited January 28, 2021) (Exhibit 22).

See, e.g., OmniCore Controllers presentation, available at https://new.abb.com/products/robotics/controllers/omnicore (last visited January 28, 2021) (Exhibit 23).

ICR5 controller:

See, e.g., Exhibit 22.

IRC5C controller:

See, e.g., IRC5C 2nd Generation presentation, available at https://new.abb.com/products/robotics/controllers/irc5c (last visited January 28, 2021) (Exhibit 24).

OmniCore controller:

See, e.g., Exhibit 9.

78. The ABB Defendants' multi-function hubs contain a physical interface configured and arranged to be a central point for a user to interface with the computational nodes of the cobot system, including the control box and the articulated robot arm.

79. On information and belief, the physical interface of the ABB Defendants' multi-function hubs contains at least one computational node.

80. The ABB Defendants' multi-function hubs were designed to master even complex operating tasks easily with an intuitive user interface. To do so, these multi-function hubs are suitable for use in a wide variety of languages for operation and programming. And on information and belief, each hub offers suitable programable logic that can be used to create and implement complex and customized programs for controlling various functions, including motion and tasks to be completed by the robot arm.

81. The ABB Defendants' multi-function hubs contain an input/output interface for interfacing with an information network and is disposed on the physical interface of the hub.

82. On information and belief, the input/output interface on these multi-function hubs is adapted to communicate with the computational node on the physical interface of the hub and at least one computational node disposed on the robot arm or controller through a common data link.

83. On information and belief, the multi-function hubs use a digital communication protocol to communicate via the common data link.

84. In violation of 35 U.S.C. § 271(b), the ABB Defendants have been and are indirectly infringing the ’317 patent by inducing infringement of this patent by others who use the ABB Defendants’ Accused Products.

85. The ABB Defendants’ affirmative acts of making, selling, and offering to sell its services and/or products, or components thereof, cause the ABB Defendants’ Accused Products to be used in a manner that infringes the ’317 patent.

86. The ABB Defendants further provide guidance and instruction to third parties to use the Accused Products in their normal and customary way to infringe the ’317 patent.

87. The ABB Defendants specifically intend that its customers infringe the ’317 patent. The ABB Defendants perform the acts that constitute induced infringement with knowledge of the ’317 patent and with knowledge or willful blindness that the induced acts would constitute infringement.

88. In violation of 35 U.S.C. § 271(c), the ABB Defendants have been and are indirectly infringing the ’317 patent by contributing to the infringement of this patent by others, such as the ABB Defendants’ customers, in the United States.

89. The ABB Defendants offered to sell and have sold in the United States, and imported into the United States, the Accused Products, which are a material part of the invention

of the ’317 patent. The ABB Defendants know that the Accused Products (i.e., a robotic arm, control box, and/or teach pendant, alone or in combination are especially made or especially adapted for an infringing use, and not a staple article or commodity of commerce suitable for substantial non-infringing use.

90. The ABB Defendants have had actual notice of the ’317 patent no later than May 5, 2020, when counsel for Northwestern sent the ABB Defendants a letter identifying the ’317 patent and Accused Products that infringe the ’317 patent.

91. The ABB Defendants willfully infringe the ’317 patent by deliberately engaging in acts of infringement on an ongoing basis with knowledge of the ’317 patent.

THIRD CAUSE OF ACTION

(Infringement of the ’508 Patent)

92. Northwestern incorporates by reference its allegations in Paragraphs 1-81 as if fully restated herein.

93. On October 10, 2006, the United States Patent and Trademark Office issued the ’508 patent, entitled “System and Architecture for Providing a Modular Intelligent Assist System.” All rights, title, and interest in and to the ’508 patent have been assigned to Northwestern, which is the sole owner of the ’508 patent.

94. The ’508 patent is valid and enforceable. The invention of the ’336 patent addressed concerns specific to cobots—the need for natural and intuitive control of a payload by a human operator through easy and safe interactions with a powered robot. The ’508 patent improves on the first generation of cobots by, among other things, claiming a configuration system for an intelligent assist system, which allows a human user to interact and use the cobot system.

95. The ABB Defendants have directly, literally under 35 U.S.C. § 271(a), and/or equivalently under the doctrine of equivalents, infringed the ’508 patent, by making, using, selling,

and/or offering to sell in the United States, and/or importing into the United States, without license or authority, the Accused Products.

96. The Accused Products meet each and every element of one or more claims of the '508 patent. By way of illustration only, the ABB Defendants' Accused Products meet each and every element of claim 1 of the '508 patent.

97. Independent claim 1 of the '508 patent recites:

> A configuration system for an intelligent assist system, the intelligent assist system comprising a module, and a computational node on the module, the configuration system comprising:
>
> a host computer system capable of executing a stored program, the host computer system being in communication with the computational node via a communication link;
>
> a graphical user interface enabling a user to manipulate objects related to the module or the computational node; and
>
> a plurality of visual indicators corresponding to a status of the module, the computational node, or the communication link.

98. On information and belief, the ABB Defendants make, use, and sell several configuration systems known as controllers for use with the Accused Products, including but not limited to the ICR5 controller, the IRC5C controller, and the OmniCore controller, as well as their accompanying teach pendants, such as the FlexPendant and Teach Pendant. *See, e.g.*, Exhibits 9, 22-24.

99. On information and belief, the ABB Defendants' controllers, alone or in combination with their accompanying teach pendants, are computer systems that are designed to communicate with, operate, and/or monitor the ABB Defendants' cobot systems, including the robot arm and/or teach pendant.

100. The ABB Defendants' controllers, alone or in combination with their accompanying teach pendants, contain modular hardware and an open, PC-based software architecture that is capable of executing a stored program.

101. On information and belief, the ABB Defendants' controllers, alone or in combination with their accompanying teach pendants, contain communication links between the controller, robot arm, and/or teach pendant that enables communication between the controller and other modules and their associated computational nodes.

102. On information and belief, the ABB Defendants' controllers and teach pendant systems contain a graphical user interface that enables a user to manipulate objects related to the articulated robot arm or related to a computational node located on the arm.

103. On information and belief, the ABB Defendants' controllers and teach pendant systems provide a plurality of indicators corresponding to the status of the articulated robot arm, a computational node on the arm, or the communication link between the controller, multi-function hub, and/or the arm.

104. On information and belief, the ABB Defendants' controllers facilitate the computational nodes' execution of motion control algorithms by the robot arm, including automatic motion control algorithms.

105. In violation of 35 U.S.C. § 271(b), the ABB Defendants have been and are indirectly infringing the '508 patent by inducing infringement of this patent by others who use the ABB Defendants' Accused Products.

106. The ABB Defendants' affirmative acts of making, selling, and offering to sell its services and/or products, or components thereof, cause the ABB Defendants' Accused Products to be used in a manner that infringes the '508 patent.

107. The ABB Defendants further provide guidance and instruction to third parties to use the Accused Products in their normal and customary way to infringe the '508 patent.

108. The ABB Defendants specifically intend that its customers infringe the '508 patent. The ABB Defendants perform the acts that constitute induced infringement with knowledge of the '508 patent and with knowledge or willful blindness that the induced acts would constitute infringement.

109. In violation of 35 U.S.C. § 271(c), the ABB Defendants have been and are indirectly infringing the '508 patent by contributing to the infringement of this patent by others, such as the ABB Defendants' customers, in the United States.

110. The ABB Defendants offered to sell and have sold in the United States, and imported into the United States, the Accused Products, which are a material part of the invention of the '508 patent. The ABB Defendants know that the Accused Products (i.e., a robotic arm, control box, and/or teach pendant, alone or in combination are especially made or especially adapted for an infringing use, and not a staple article or commodity of commerce suitable for substantial non-infringing use.

111. The ABB Defendants have had actual notice of the '508 patent no later than May 5, 2020, when counsel for Northwestern sent the ABB Defendants a letter identifying the '508 patent and accused products that infringe the '508 patent.

112. The ABB Defendants willfully infringe the '508 patent by deliberately engaging in acts of infringement on an ongoing basis with knowledge of the '508 patent.

PRAYER FOR RELIEF

WHEREFORE, Northwestern respectfully requests that this Court:

A. enter a judgment that the ABB Defendants infringe each of the asserted patents;

B. order an award of damages to Northwestern in an amount adequate to compensate

Northwestern for the ABB Defendants' infringement, said damages to be no less than a reasonable royalty;

C. enter a judgment that the infringement was willful and treble damages under 35 U.S.C. § 284;

D. order an accounting to determine the damages to be awarded to Northwestern as a result of the ABB Defendants' infringement, including an accounting for infringing sales not presented at trial and award additional damages for any such infringing sales;

E. assess pre-judgment and post-judgment interest and costs against the ABB Defendants, together with an award of such interest and costs, in accordance with 35 U.S.C. § 284;

F. render a finding that this case is "exceptional" and award to Northwestern its costs, expenses, and reasonable attorneys' fees, as provided by 35 U.S.C. § 285;

G. grant other and further relief as the Court may deem proper and just.

JURY DEMAND

Pursuant to Federal Rule of Civil Procedure 38, Northwestern respectfully demands a jury trial on all issues and claims so triable.

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June 17, 2021

CERTIFICATE OF SERVICE

I hereby certify that on June 17, 2021, I caused the foregoing to be electronically filed with the Clerk of the Court using CM/ECF, which will send notification of such filing to all registered participants.

I further certify that I caused copies of the foregoing document to be served on June 17, 2021, upon the following in the manner indicated:

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VIA ELECTRONIC MAIL

/s/ Jeremy A. Tigan

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