

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS**

ePROPELLED INC.

Plaintiff,

v.

EXRO TECHNOLOGIES INC.,

Defendant.

CIVIL ACTION NO.

**JURY TRIAL
DEMANDED**

COMPLAINT

Plaintiff, ePropelled Inc., brings this action for patent infringement under the patent laws of the United States, Title 35 of the United States Code, and alleges as follows, upon actual knowledge with respect to itself and its own acts, and upon information and belief as to all other matters:

PARTIES

1. Plaintiff ePropelled, Inc. is a Massachusetts corporation that is organized and exists under the laws of the State of Delaware with a principal place of business at 116 John St., Suite 205, Lowell, Middlesex County, MA 01852.

2. ePropelled is a leading expert in magnetic engineering innovations that dramatically improve electric motor and generator efficiencies for propulsion systems in many industries. ePropelled’s patented Dynamic Torque Switching™ (eDTS™) technology provides benefits including allowing an electric motor to provide high torque at low speeds without drawing high current from the batteries, operate at high speeds without deep field weakening, and reconfigure windings using switches in parallel, series, and combinations on the fly (while

operating). This eDTS™ technology delivers a significant improvement in power efficiency and performance, which can translate into, for example, a net reduction in electric vehicle (EV) cost through smaller battery packs, extended driving range, or a combination of the two.

3. Defendant Exro Technologies Inc. is, upon information and belief, a Canadian corporation, with a principal place of business at 1000 - 355 Burrard St., Vancouver, British Columbia V6C 2G8 Canada.

4. Upon information and belief, Exro Technologies Inc. was first incorporated under the laws of British Columbia on February 11, 2014, under the name “BioDE Ventures Ltd.” (BioDE) as a wholly-owned subsidiary of Carrus Capital Corporation (“Carrus”). In 2017, Exro acquired BioDE and changed its name to Exro Technologies Inc.

JURISDICTION AND VENUE

5. This action for patent infringement arises under the patent laws of the United States, Title 35 of the United States Code. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

6. Defendants are subject to personal jurisdiction in this district because Defendants regularly transact business in this district by, among other things, making, using, selling, or offering to sell products to customers located in this district.

7. Venue is proper in this District under 28 U.S.C. § 1391(c)(3).

PATENT-IN-SUIT

8. On June 3, 2008, U.S. Patent No. 7,382,103, entitled “Magnetic Gearing of Permanent Magnet Brushless Motors” (“the ’103 patent”) was duly and legally issued to inventors Nabeel Ahmed Shirazee and Praveen Choudhary. The ’103 patent issued from Application No. 10/576,573, filed April 18, 2006, as a §371(c)(1) application of

PCT/GB2004/004512, all of which claim priority to a patent application (GB0324785.5) filed in Great Britain on October 24, 2003. A copy of the '103 patent is attached hereto as Exhibit A.

9. ePropelled, Inc. is the owner of all rights and title in the '103 patent, including without limitation the right to sue and recover for past infringement.

10. Claim 1 of the '103 patent recites:

A permanent magnet brushless motor comprising:

a stator comprising one or more phases, wherein at least one given phase of the stator includes a plurality of winding sections;

a rotor rotatably mounted relative to the stator and comprising at least one permanent magnet; and

switch means comprising a plurality of switching devices for simultaneously connecting all of the winding sections of the given phase in one of a plurality of different configurations, wherein said switching devices are disposed at opposite ends of each winding section and are arranged to connect each winding section in series and/or parallel with all other winding sections of the given phase.

11. Each and every claim of the '103 patent is valid and enforceable, and each enjoys a statutory presumption of validity under 35 U.S.C. §282.

NATURE OF THE ACTION

12. This is a civil action arising out of the acts and actions of Exro Technologies Inc. ("Defendant" or "Exro") for infringement of United State Patent No. 7,382,103 ("the '103 patent") under the United States Patent Laws §100 *et seq.*

13. Defendant has copied ePropelled's patented Dynamic Torque Switching™ (eDTS™) technology, an innovative electric propulsion technology for a range of electric vehicles (EVs). Upon information and belief, Defendant has been making, using, selling, and/or offering to sell within the United States and/or importing into the United States products with

Coil Driver™ technology that infringe, directly and/or indirectly, either literally and/or under the doctrine of equivalents, at least claim 1 of U.S. Patent No. 7,382,103.

14. Defendant's infringing products include the Coil Drive System™ as described in the data sheet filed herewith as Exhibit B; Exhibit M.

15. Defendant is aware of ePropelled's valuable '103 patent and nonetheless continues to infringe it.

16. Defendant is liable to ePropelled for monetary damages as a result of its infringement and should be permanently enjoined from infringing and actively contributing to and inducing infringement of the '103 patent.

ePROPELLED

17. Nabeel Ahmed Shirazee and Praveen Choudhary are the sole inventors of the '103 patent.

18. Dr. Shirazee is a talented engineer with a Master of Science in Electromagnetics Engineering and a Ph.D. in Magnetics Engineering. In 1999, Dr. Shirazee founded Electronica Products Limited (also called Electronica UK), a magnetics research and design consultancy company based in Cardiff, UK. Electronica UK won several awards and grants from the government of Wales for its innovative technologies.

19. In 2003, while working in the aeronautics and automotive industry, Dr. Shirazee began thinking of ways to make better and more efficient electric motors. He developed the idea of having multiple windings in the motor, with switches at the ends of the windings, arranged to connect each winding section in series and/or in parallel with the other windings of a given phase.

20. Together with co-inventor, Dr. Praveen Choudhary, Dr. Shirazee developed and patented this technology in multiple countries around the world, including the '103 patent issued in the United States. Drs. Shirazee and Choudhary assigned all rights and title in the '103 patent to Electronica Products, Ltd.

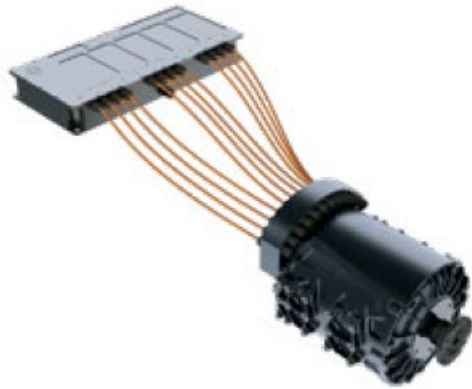
21. In 2018, Electronica Products, Ltd. was acquired by ePropelled Inc. and changed its name to ePropelled Ltd. ePropelled Ltd. is a wholly-owned subsidiary of ePropelled, Inc. As Global Chief Technology Officer for ePropelled, Inc., Dr. Shirazee continues his work with others at ePropelled in developing innovative electric propulsion systems for transport vehicles.

22. With the technology claimed in the '103 patent and corresponding foreign patents as a foundation, ePropelled is a recognized leader in the electric vehicle field. ePropelled's patented EV technology significantly improves performance by, in some cases, 40%. Companies experience massive savings by being able to eliminate the gearbox and a significant portion of the battery pack.

23. ePropelled's Dynamic Torque Switching™ technology is core to its business. It has invested, and continues to invest, millions of dollars in resources needed to test, commercialize, and market products containing this technology. ePropelled has also made, and continues to make, significant investments in developing and protecting its worldwide intellectual property portfolio.

DEFENDANT AND ITS INFRINGING PRODUCTS

24. Upon information and belief, and as advertised on its website, Defendant markets, makes, has made, offers for sale and/or sells a Coil Drive System™ (CDS), shown below ("Accused System"). *See* Exhibit B; Exhibit M.



25. Upon information and belief, the Exro Coil Drive™ System has a permanent magnet brushless motor, as shown below. *See* Exhibit B; Exhibit M.

26. Upon information and belief, the Exro Coil Drive™ System includes a PMSM that has a stator having one or more phases, and at least one phase has a plurality of winding sections. *See* Exhibit B; Exhibit M.

27. Upon information and belief, the Exro Coil Drive™ System has a rotor rotatably mounted relative to the stator and comprising at least one permanent magnet.

28. Upon information and belief, the Exro Coil Drive™ System has an inverter or motor controller that enables direct control of motor configurations via 12 leads and “switching between series and parallel modes on the fly.” *See* Exhibit C.

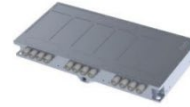
29. Upon information and belief, Defendant also markets, makes, has made, offers for sale and/or sells Coil Drivers™ (“Accused Device”), a component designed to be integrated with electric motors comprising rotors and stators to result in an infringing motor system. Exhibit D is a datasheet for the Coil Driver™ from Exro’s website.

30. On its website, Defendant claims that the Accused Device “switch[es] automatically and seamlessly” to “select[s] the appropriate torque profile to optimize the current

torque and speed demand.” Exhibit I. The Accused Devices are offered in varying voltages for various markets, such as e-scooters, electric cars and motorcycles, vans, trucks, and busses.

Coil Driver Product Line

Powerful, efficient, versatile.



Product family	LOW VOLTAGE		HIGH VOLTAGE	
	Nominal voltage	Up to 48V	Up to 100V	Up to 400V
Power Module	Si FET	Si FET	SiC FET	SiC FET
Addressable markets	Recreational E-scooters	Electric cars Motorcycles	Fleet vans SUVs & trucks	Trucks & Buses Super cars

Form factor may change as applications changes. All options may be customized as needed.
Si FET = Silicon field effect transistor
SiC FET = Silicon carbide field effect transistor

Full product offering covering complete range of mobility applications

See Exhibit E, p. 19.

31. Upon information and belief, and as advertised on its website, Defendant provides the Accused Device as a component of an infringing system with no substantial non-infringing uses to third parties and induces those third parties to infringe by using Defendant’s Accused Device to construct infringing systems. Defendant also sells or otherwise provides Accused Devices to third parties and couples them with components made or provided by the third party to construct infringing systems.

32. On September 9, 2019, Defendant announced that it had entered into an agreement to supply Motorino Electric, a Canadian company that makes electric bicycles, scooters, and motorcycles, with Accused Devices for use in constructing systems that infringe the ’103 patent. On December 18, 2019, Defendant announced that it had delivered the first Exro-powered e-Bike to Motorino Electric. See Exhibit F., pp. 5-6.

33. In some instances, Defendant modifies a motor provided by a third party and couples it with an Accused Device to make an infringing system, as it did to construct a Motorino e-bike. <https://www.youtube.com/watch?v=qTYL857VjIA>.

34. Upon information and belief, Motorino e-bikes, such as the PopStar and RockStar models, are sold at various locations within Massachusetts.

35. Defendant states on its website that it would be incorporating its coil drive technology into vehicles made by SEA Electric, a global automotive company headquartered in Los Angeles, CA, that makes electric-powered vans, commuter busses and light/medium duty trucks. In July 2020, Defendant announced that it would develop and test powertrains “based on Exro’s Coil Driver and SEA-Drive technologies” in heavy duty trucks and delivery vehicles, the market for which they estimated will surge from US\$19.8 billion in 2020 to US\$38.6 billion in 2025. *See* Exhibit J.

36. Defendant expects SEA Electric trucks with Exro technology will be delivered in Q2 2022. Exhibit K.

37. On December 2, 2021, Defendant announced it was working with Land Electric Motorcycles of Cleveland, Ohio, to integrate the Accused Device into the Land motorcycle design. Exhibit L.

38. In December 2021, Defendant announced it would integrate its 100 Volt Coil Driver technology into Untitled Motorcycle’s XP Zero electric motorcycle, and that the XP Zero would be displayed at the Consumer Electronics Show (CES) in Las Vegas, NV, January 5-8, 2022. Exhibit Q.

39. Upon information and belief, the XP Zero electric motorcycle was displayed at CES in Las Vegas, and tested in Sacramento, CA at some point prior to Jan. 2, 2022. *See* <https://www.youtube.com/watch?v=NQ6rapY1AyE>.

40. Upon information and belief, Untitled Motorcycles builds motorcycles in San Francisco.

41. In April 2021, Defendant announced it had entered into an agreement with Vicinity Motor Corp. to supply the Accused System and/or Accused Device for use in electric busses. Upon information and belief, the Vicinity buses are manufactured in Canada “or at the Company’s Buy America Act compliant assembly facility in Washington state.” Exhibit P.

42. Upon information and belief, in the fall of 2021, Defendant had its Accused System tested by AVL in Plymouth, MI. Defendant published test results dated October 2021 on its website. *See* Exhibit H.

43. In addition to copying ePropelled’s technology, Defendant is copying ePropelled’s successful branding of its patented Dynamic Torque Switching[™] (eDTS[™]) technology.

44. Within weeks of ePropelled posting announcements of its patented Dynamic Torque Switching[™] (eDTS[™]) technology, upon information and belief, Defendant changed its advertising for its coil driver to claim it uses “dynamic torque switching”. Exhibit I.

45. Prior to ePropelled’s pioneering use of “Dynamic Torque Switching,” the mark had not been used in the marketplace.

46. Defendant did not use “dynamic torque switching” in describing its technology in its Q3 2021 Corporate Presentation to investors on September 28, 2021. *See* Exhibit E.

47. Defendant is also actively marketing its products in the United States. Defendant displayed and demonstrated its coil driver products physically at the 2022 CES in Las Vegas, NV, although the CEO of Exro decided last minute to present virtually due to the pandemic. *See* <https://www.youtube.com/watch?v=NQ6rapY1AyE>. According to the presenter in this video, Defendant shipped products to Las Vegas, set them up for display, and had salespeople present to explain the products.

48. The displayed products included a Humvee, an XP Zero motorcycle, and a Polaris Ranger, all of which comprise infringing systems as configured by Defendant. The Polaris Ranger Utility Terrain Vehicle (UTV) and the XP Zero motorcycle in the video above comprise a brushless motor retrofitted with Defendant's 100-Volt Coil Driver. The Humvee displayed at CES comprises Defendant's 800-Volt Coil Driver and a single brushless motor.

49. Upon information and belief, and as stated in the video, Defendant plans to continue to demonstrate these products in Arizona, offer to sell these products in person and online, and sell these products to potential customers in the United States.

50. ePropelled became aware that Defendant was advertising and offering for sale Accused Systems that fell within the scope of ePropelled's '103 patent.

51. On October 7, 2021, ePropelled sent a letter to Mr. Jonathan Ritchey, Chief Scientist and CTO of Exro, providing a copy of the '103 patent and asking Defendant to explain how its coil driver technology was different from the claims in the '103 patent.

52. Defendant acknowledged receipt of the letter on October 15, 2021 but has not otherwise responded or contacted ePropelled to license the '103 patent.

53. Upon information and belief, Defendant continues to make, have made, import into, offer for sale, and sell the Accused System and/or Accused Device in the United States and elsewhere.

54. Fully aware of ePropelled's '103 patent, Defendant has acted and continues to act knowingly, willfully, with reckless disregard of those rights and laws, and in bad faith.

COUNT I
Infringement of U.S. Patent No. 7,382,103

55. ePropelled repeats and realleges each and every allegation set forth in this Complaint.

56. Defendant has been making, using, selling, or offering for sale in the United States, or importing into the United States Accused Systems that are directly infringing, with willfulness or willful blindness, either literally and/or under the doctrine of equivalents, at least claim 1 of the '103 patent in violation of 35 U.S.C. §271. A claim chart providing an example of the manner in which the Accused Systems are infringing claim 1 is attached as Exhibit G.

57. Upon information and belief, Defendant actively integrates their Accused Device into products provided by customers.

58. Upon information and belief, Defendant actively, knowingly, and intentionally has been and continues to materially contribute to infringement of the '103 patent, in violation of 35 U.S.C. § 271(c), literally and/or under the doctrine of equivalents. Upon information and belief, Defendant actively offers to sell, imports, and/or sells their Accused Device to customers in the United States for use in the customers' products, the Accused Device having no other purpose than to form an infringing motor as recited in claim 1. The Accused Device constitutes a material part of the infringing system and is not suitable for substantial noninfringing use.

59. Defendant also actively, knowingly, and intentionally has been and continues to induce infringement of the '103 patent in violation of 35 U.S.C. §271(b), literally and/or under the doctrine of equivalents, by their customers. Upon information and belief, Defendant's customers integrate Accused Devices obtained from Defendant with motors having stators and rotors not obtained from Defendant to make infringing systems. Customers do so at the active encouragement, direction, instruction, and inducement of Defendant.

60. Defendants has had knowledge of or was willfully blind to the '103 patent at least since receiving actual notice of the '103 patent by at least October 7, 2021. Upon information and belief, after receiving actual notice of the '103 patent, Defendant thereafter continued to sell, offer to sell, use, make, and import the Accused System into the United States with the knowledge and intent that the Accused System infringes the '103 patent.

61. Upon information and belief, after receiving actual notice of the '103 patent, Defendant thereafter continued to sell, offer to sell, and/or import into the United States the Accused Device to customers in the United States knowing that its assembly with other components in the United States, either by itself or customers, would create a system that infringes the '103 patent.

62. As a result of Defendant's infringement of the '103 patent, ePropelled has suffered and continues to suffer damages. ePropelled is entitled to recover from Defendant the damages sustained as a result of Defendant's wrongful and infringing acts.

63. ePropelled will also continue to suffer damages and irreparable harm for which there is no remedy at law unless Defendant's infringing activities are enjoined by this Court. ePropelled practices the '103 patent with its own eDTS technology products.

64. Examples of damage to ePropelled include loss of market share, loss of customer sales, and loss of revenue and profits it would have obtained but for Defendant's infringement.

JURY DEMAND

Pursuant to Fed. R. Civ. P. 38, ePropelled respectfully demands a trial by jury on all issues properly triable by a jury in this action.

PRAYER FOR RELIEF

WHEREFORE, ePropelled respectfully requests that this Court enter judgment in its favor on each and every claim for relief set forth above and award it relief, including but not limited to the following:

- A. A judgment in favor of ePropelled that Defendant has and is infringing the '103 Patent;
- B. A judgment that Defendant's infringement is willful;
- C. A judgement declaring this case is exceptional within the meaning of 35 U.S.C. § 285;
- D. A permanent injunction enjoining Defendant from infringing the '103 patent;
- E. A judgment ordering Defendant to pay ePropelled its damages for infringement of the '103 patent to the full extent permitted under 35 U.S.C. § 284, including, but not limited to lost profits and/or a reasonable royalty, enhanced damages, costs, expenses, prejudgment and post-judgment interest, and attorneys' fees;
- F. Other relief as the Court may deem appropriate.

Dated: January 21, 2022

Respectfully submitted,

/s/ Linda J. Thayer
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