

**STATEMENT OF CONSIDERATIONS**

REQUEST BY BORGWARNER, INC. FOR WAIVER OF DOMESTIC AND FOREIGN PATENT RIGHTS IN THE IDENTIFIED INVENTIONS, DOE DOCKET NO. S-144,416, US PATENT NO. 10,163,572 MADE DURING PERFORMANCE OF SUB-CONTRACT NO. 4F-30141 to DELPHI AUTOMOTIVE SYSTEMS, LLC UNDER AWARD DE-AC02-06CH11357

W(I)2022-003, S-144,416; US Patent No. 10,163,572

W(I)2022-003, S-144,416; Chinese Patent No. 201710253111.7

W(I)2022-003, S-144,416; German Patent No. 602017003761.3

W(I)2022-003, S-144,416; French Patent No. 323999

W(I)2022-003, S-144,416; Great Britain Patent No. 323999

This waiver request is for domestic and foreign rights in the above identified invention made by employees of Delphi Automotive Systems (Delphi), under sub-contract No. 4F-301, to award DE-AC02-06CH1135. In 2017 Delphi split into two companies, Aptiv and Delphi Technologies, PLC. On October 1, 2020, Delphi Technologies PLC was acquired by BorgWarner, Inc. (BorgWarner). BorgWarner has requested the instant patent waiver to obtain the entire right, title, and interest in the above identified inventions.

The objective of the award was to develop a cost-effective process for fabricating compact, high-temperature Pb-La-Zr-Ti-O (PLZT) based DC-link capacitors for advanced traction drive inverters for EVs. The primary purpose of this project was to design, develop, fabricate, and test a DC-link capacitor for use in electric drive vehicle traction drive inverter systems to enable reduction in the inverter system's cost, size, and weight by at least 50% compared to the previous baseline system from 2011-2012, while also enabling the capacitor and inverter to operate in higher temperature environments for even greater vehicle level savings. Smaller, more cost-effective traction drive inverters will help to broaden the market for more fuel-efficient EVs, thereby lowering the carbon footprint of personal and commercial vehicles, while reducing U.S. dependence of foreign energy sources and advancing the U.S. manufacturing competitiveness for EVs more specifically.

During the program, sample PLZT capacitors were fabricated at Delphi engineering facilities in Kokomo, Indiana and tested at Delphi and ANL. No full inverters were built containing the PLZT capacitors.

The award funding allotted to Delphi totaled \$810,000. While Delphi did not contribute cost share to the subcontract, Delphi made substantial investments to further develop the technology, for example, on a related CRADA (cost share of \$3.38M on the total of \$7.712M for a 44% cost share) and Delphi (BorgWarner) has invested an

additional \$35M for new equipment to upgrade and expand its Kokomo, IN power electronics validation and production capacity for its traction drive inverters and other power electronics products.

Referring to items 5-9 of the waiver petition, BorgWarner is a leading Tier 1 automotive supplier and has engineering and manufacturing facilities throughout the world. Developing innovative product and manufacturing technologies are a core competency for BorgWarner to maintain its global competitiveness. This core competency includes an in-house product and manufacturing engineering team dedicated to new product development and production of BorgWarner's Power Drive Systems (PDS), (also known as Power Electronics) in Kokomo, Indiana, Noblesville, Indiana and Auburn Hills, Michigan for the global market.

Shortly after the subject program, a new thin film capacitor technology (NanoLam™) was developed and patented by a third party in the United States. The NanoLam™ device is a prismatic polymer monolithic capacitor structure that includes multiple interleaving radiation-cured polymer dielectric layers and metal layers. The PLZT capacitor does not have the temperature capability of the NanoLam™ capacitor. Thus BorgWarner chose to use the NanoLam™ capacitor for use in its automotive traction inverters and **not** the PLZT capacitors developed during the subject program. There are no immediate plans for commercial utilization of the PLZT capacitors nor investments of BorgWarner resources. However, BorgWarner recognizes that the PLZT capacitor technology may be of a future use.

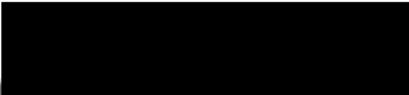
The Petitioner has agreed that this waiver will be subject to the march-in and preference for U.S. industry provisions, as well as the U.S. Government license, set out in 35 U.S.C. 202-204. Further, Petitioner has agreed to the attached U.S. Competitiveness provision (paragraph (t)). In brief, Petitioner has agreed that products embodying a waived invention or produced through the use of a waived invention will be manufactured substantially in the United States unless the Petitioner can show to the satisfaction of the DOE that it is not commercially feasible to do so. The Petitioner has further agreed to make the above conditions binding on any assignee or licensee or any entity otherwise acquiring rights in the waived inventions, including subsequent assignees and licensees. Should the Petitioner or other such entity receiving rights in a waived invention undergo a change in ownership amounting to a controlling interest, then the waiver, assignment, license, or other transfer of rights in the waived inventions is suspended until approved in writing by DOE.

Referring to item 10 of the waiver petition, granting this waiver will little if any adverse impact on competition BorgWarner does not anticipate an adverse effect on competition and market concentration, should this waiver be granted as requested. Through the substantial change the industry's approach for building the capacitors needed for vehicle electrification, BorgWarner's products, where the resulting capacitor technology would first be applied, will be available to all vehicle manufacturers, as well

as manufacturers of equipment in all other fields with a similar requirement. Additionally, BorgWarner maintains there is a wide range of capacitor technologies that are candidates for accomplishing similar reductions in capacitor size and cost, as well as operating at higher temperatures than today's automotive-qualified capacitors.

Finally, the approach that this technology enabled by Argonne and Delphi (now BorgWarner) will be sufficiently different from the way capacitors are manufactured today, so that the barriers to entry, including the required capital investment, should be reduced for potentially new capacitor manufacturers. A reduction in the barriers to entry would be by BorgWarner licensing the PLZT capacitor technology here in the United States for automotive and non-automotive markets. Therefore, the net effect of this waiver should be to stimulate competition and lessen market concentration compared to today's capacitor industry, where only a few suppliers account for most of the raw material, the film and film metallization, and the winding of the higher voltage / power capacitors required for electrified vehicles and adjacent markets. in this still immature field.

Considering the foregoing, it is believed that grant this waiver will provide the Petitioner with the necessary incentive to invest its resources in the commercialization of the results of the agreement in a fashion which will make the technology available to the public in the shortest practicable time. Therefore, upon evaluation of the waiver petition and in view of the objectives and considerations set forth in 10 CFR 784, all of which have been considered, it is recommended that the requested waiver be granted.



---

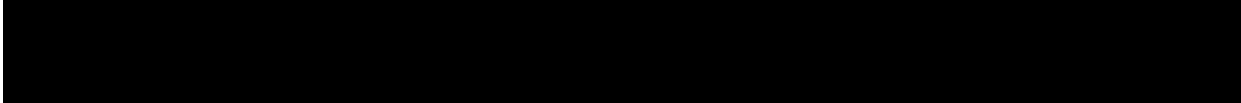
Karen L. Blouin  
Assistant Chief Counsel  
Intellectual Property Law

Date: 13 July 23

Based upon the foregoing Statement of Considerations and representations in the attached waiver petition, it is determined that the interests of the U.S. and the general public will best be served by a waiver of patent rights of the scope described above, and therefore the waiver is granted.

CONCURRENCE:

APPROVAL:



Sarah Ollila  
Deputy Director of Vehicle Technologies  
Office, EE-3V

Brian J. Lally  
Assistant General Counsel for Technology  
Transfer and Intellectual Property, GC-62

Date: \_\_\_\_\_

Date: \_\_\_\_\_

WAIVER ACTION - ABSTRACT

W(I)-2022-003

REQUESTOR

BorgWarner,  
Inc.

CONTRACT SCOPE

Develop a cost-effective process for fabricating compact, high-temperature Pb-La-Zr-Ti-O (PLZT) based DC-link capacitors for advanced traction drive inverters for EVs.

RATIONALE FOR DECISION

For potential future commercial utilization of the PLZT capacitors

## (t) U. S. Competitiveness

The Contractor agrees that any products embodying any subject invention or produced through the use of any subject invention will be manufactured substantially in the United States unless the Contractor can show to the satisfaction of DOE that it is not commercially feasible. In the event DOE agrees to foreign manufacture, there will be a requirement that the Government's support of the technology be recognized in some appropriate manner, e.g., recoupment of the Government's investment, etc. The Contractor agrees that it will not license, assign or otherwise transfer any waived invention to any entity unless that entity agrees to these same requirements. Should the Contractor or other such entity receiving rights in the invention(s): (1) undergo a change in ownership amounting to a controlling interest, or (2) sell, assign, or otherwise transfer title or exclusive rights in the invention(s), then the waiver, assignment, license, or other transfer of rights in the waived invention(s) is/are suspended until approved in writing by DOE. Notwithstanding the conditions when the Government may obtain title provided in paragraph (d) of this clause, the Contractor also shall assign and hereby assigns to DOE, upon written request from DOE, title to any subject invention, upon a breach of this paragraph.