L&KF Co., Ltd.

NON-CONTACT EXPANDED BEAM CONNECTOR

Technical Dossier | Expanded Beam Connector | Non-Contact Optical Technology

Research Lead: Lee Soo Young | L&KF Co., Ltd. | Former CEO of FOSTEC Co., Ltd. (2001-2023) | 2024

1. Technology Overview

1.1 What is a Non-Contact Expanded Beam Connector?

A non-contact expanded beam connector converts an optical signal into an expanded beam using a ball lens, then transmits the signal through a non-contact optical interface. Because the optical endfaces do not directly touch, this approach can reduce sensitivity to dust, moisture, shock and repeated field handling when compared with conventional physical-contact interfaces.

Physical Contact Connector	Non-Contact Expanded Beam Connector
Direct contact between fiber endfaces	Beam expansion and non-contact optical transmission using ball lenses
Highly sensitive to dust and endface contamination	Reduced sensitivity to localized contamination at the optical interface
Best suited to clean and controlled indoor environments	Suitable for review in defense, plant, marine, broadcasting and outdoor systems
Specialist inspection and cleaning are often required	Designed to support simpler field-level maintenance procedures

1.2 Technology Development Timeline

The following timeline is an English summary of the Korean source material provided for L&KF. Each item should be checked against original news articles, certificates, test reports and internal records before public release.

Year	Source	Key Milestone
2001	Company foundation	FOSTEC Co., Ltd. founded as a fiber-optic communications company.
2005	Newswire	Commercialization of MIL-type optical jumper cords with waterproof and moisture-resistant characteristics.
2011	Information & Communications News	Outdoor optical connector niche market development began.
2012	AVING News	Non-contact beam connector for broadcasting relay applications introduced at KOBA 2012.
2013	Industry News	Participation in OFC 2013 in the U.S. and global launch of the FOBEX brand.
2013	Electronic Times	Selected as a popular product in the first half of 2013; ball-lens beam expansion approach noted.
2014	Boan News	Passed defense field deployment specification and entered the military supply chain.
2017	Maeil Business Newspaper	Selected as a World Class Product of Korea in the expanded beam connector field.
2018	DataNet	Non-contact connector announced for TICN-related tactical communication applications.
2019	Electronic Times	Received quality excellence recognition as a popular product in the second half of 2019.
2020	Robot News	Special non-contact connector supply contract for marine robot/mobility applications.
2020	Newswire	Improved ball-lens optical alignment and obtained performance certification from MSS.
2022	Seoul e-News	Applications diversified into aerospace, radioactive waste sites and outdoor broadcasting; export to 30 countries stated.
2022	Ansan Chamber of Commerce	High-density multi-channel non-contact optical connector development completed.
2023	Newswire	Announced entry into the silicon photonics market with up to 24-core expanded beam connectors.
2023	Youth Daily	FOBEX-HD high-density 24-channel product officially released.
2023	Defense Today	Optical cable assembly supplied for a naval frigate radar system.

1.3 Core Technical Features

- Ball-lens beam expansion: expands the optical core image and enables non-contact transmission.
- MIL-spec-oriented design review: supports waterproofing, moisture resistance, shock and vibration considerations according to project requirements.
- Optical performance focus: insertion loss and return loss must be finalized by product structure, cable, termination and test conditions.
- Field maintenance concept: designed for easier inspection, cleaning and replacement in field environments.
- High-density multi-channel direction: supports review of high-channel-count optical connection concepts.
- Hybrid structure review: optical and electrical contact combinations can be reviewed for defense and industrial systems.

1.4 Product Line-up

Product Series	Standard / Size	Primary Application Area
83526 Series	MINI / JUNIOR / SENIOR / MAXI	Defense, plant and industrial field applications
38999 Series III	Shell 11 / 15 / 17 / 19	Defense, aerospace and naval systems
FOBEX-HD	24-channel high-density configuration	Silicon photonics, data center and 5G-related applications
Hybrid Optical + Electrical	Composite structure	Combined optical and electrical signal transmission
Special Marine Type	High-pressure watertight structure	Marine robots and underwater mobility applications

1.5 Certifications and Awards

- World Class Product of Korea selection in the expanded beam connector field - 2017.
- Performance certification from the Ministry of SMEs and Startups - certification number stated in Korean source: 19-AC10309.
- AS9100 aerospace quality management certification stated in the source material.
- ISO 9001 / ISO 14001 / OHSAS 18001 certifications stated in the source material.
- Electronic Times popular product quality excellence recognition - 2013 and 2019.
- Defense field deployment specification passed - 2014.

1.6 Export Performance

- Exports to more than 30 countries stated in the source material as of 2022.
- Annual export value of approximately USD 2 million stated for 2016 in the Korean source material.
- Major markets described as Southeast Asia, Europe, the Middle East and countries with high defense expenditure.
- Target markets include Taiwan, Finland, Turkey, Singapore, India, Pakistan and Japan.

2. Applications and Reference Areas

Defense and Military TICN-related tactical communication systems; defense field specification review; naval radar optical cable assembly references stated in the source material.	**Marine and Underwater** High-pressure, high-salinity and moisture-resistant connector concepts for marine robots and underwater mobility.
Broadcasting and Media Outdoor live broadcasting and relay applications where rain, mud and field contamination can affect connector reliability.	**Industrial Plants and Energy** Harsh sites where maintenance access is limited and connector durability is critical.
Silicon Photonics, 5G and Data Centers High-density 24-core connection concepts for next-generation optical interconnects.	

3. Research Lead Profile - Lee Soo Young

Item	Description
Current Affiliation	L&KF Co., Ltd.
Role	Beam connector research and development lead
Previous Affiliation	Former CEO of FOSTEC Co., Ltd. (2001-2023, 22 years)
Brand Development	Creator of the FOBEX non-contact expanded beam connector brand
Key Achievements	Defense deployment, World Class Product selection, exports to 30 countries, AS9100 certification, FOBEX-HD 24-channel release
Current Research	Continued development of non-contact expanded beam connector technology and next-generation high-density optical interconnection at L&KF

Lee Soo Young is described in the Korean source material as a pioneer who founded FOSTEC in 2001 after introducing fiber-optic communication technology from the United Kingdom, commercialized the FOBEX brand across defense, marine, broadcasting and industrial fields, and has continued next-generation high-density optical interconnection research at L&KF since 2023.

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