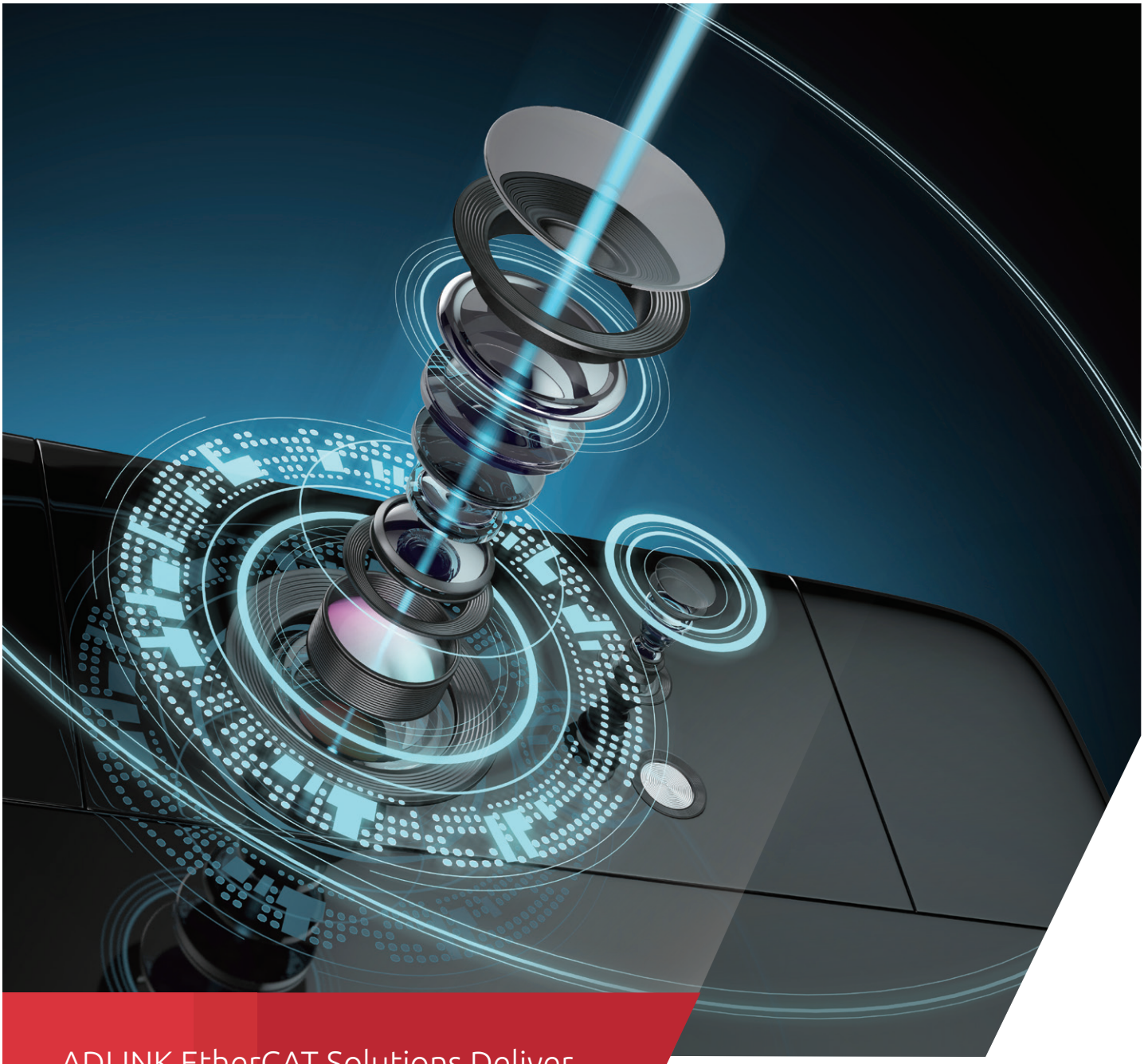
ADLINK
LEADING EDGE COMPUTING



ADLINK EtherCAT Solutions Deliver High Precision Synchronization for Optical Lens Manufacturing Processes

Use Case

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Overview

The optical lens market is expected to see continued growth as smartphone manufacturers focus on the quality of their cameras as a major product differentiator. The growth is being driven by more people using smartphones to replace their standalone cameras, the drive towards camera resolutions beyond 16 megapixels, and the introduction of dual-lens cameras for improved zoom and different focal lengths. Even in the wake of COVID-19, the overall optical lens market is expected to grow with a CAGR of 8% from 2021 to 2026.

As optical lens manufacturers increase production capacity and speed up production to keep up with demand for these higher quality lenses, they are finding it more and more challenging to maintain their production quality, especially as they look for help with expansion while keeping their biggest trade secrets close to their chest.

High-quality Optical Lenses Require Precision Assembly to Optimize Output and Ensure Image Quality

As modern camera modules shrink, the lenses must meet increasingly stringent standards to ensure that image quality continues to surpass that of the previous generation of lenses. If the bonding angles and the position between lenses are not measured with sufficient precision then misalignment of the optical axis may occur, resulting in blurred images and poor quality. Higher production speeds also strain the production line, compounding minor inaccuracies in the system and lowering overall usable yield.

Exclusive technologies that take years of specialist in-house development give optical lens manufacturers their competitive edge, and help maintain output quality and production levels. Most of the production equipment is selected and assembled through the research and development of the in-house automation team. Buying equipment through regular suppliers exposes them to the risk of leaked trade secrets, so they must find ways to squeeze maximum capacity out of their existing equipment to respond to rapid production line changes while still meeting the precision control requirements.

ADLINK EtherCAT Enables In-house Automation Development to Boost Bonding Accuracy by Optimizing Synchronization Between Processes

ADLINK's EtherCAT solution has enabled the optical lens manufacturer to achieve a 25% reduction in production costs compared to their previous industrial PC solution and boost production efficiency by 20% with a shorter development time. They used their in-house development team's automation expertise to develop more accurate bonding systems, increase capacity, enhance responsiveness to production line changes, and satisfy precision control requirements without risking exposing their trade secrets to outside suppliers.

Higher accuracy is achieved through 64-axis synchronized control. This level of precision is critical for camera modules in a variety of applications that require camera lenses that are both smaller than ever

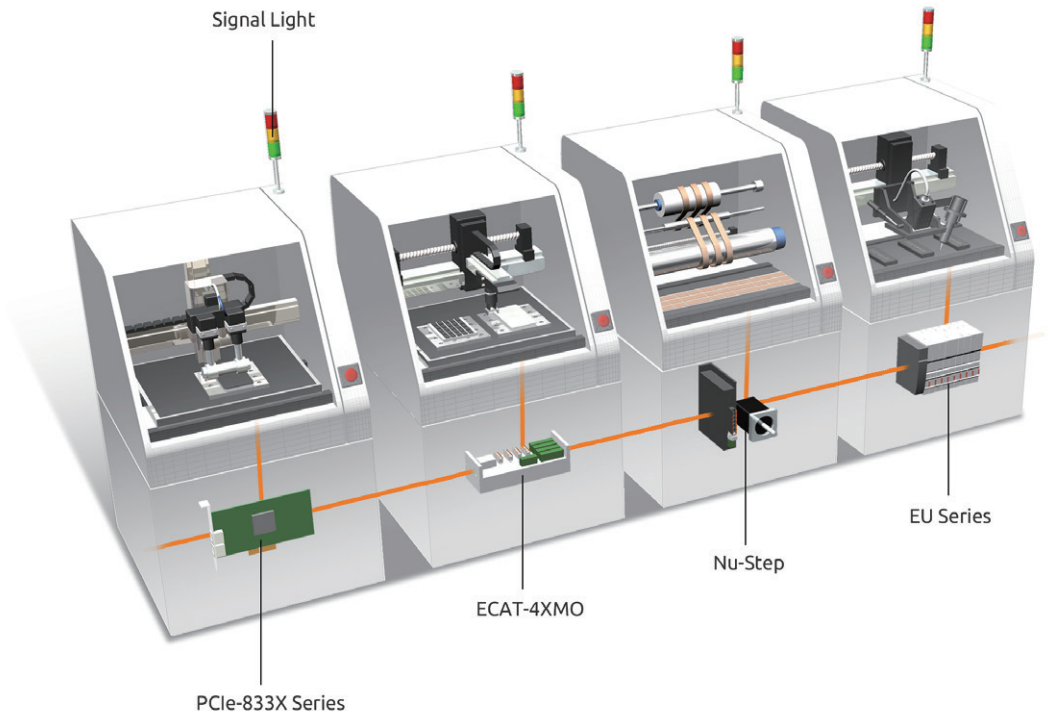
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before, but must be of a level of quality only achievable with precise bonding angles between lenses possible with optical axis alignment.

Increased capacity is possible due to the responsiveness and speed of EtherCAT. With higher speed data transmission and lower latency, production speed increases are possible while maintaining quality. With 10,000 DIO and 2,500 AIO, there's ample room for expansion. This increased capacity leads to a 20% boost in production efficiency.

Flexible capacity is a result of the simplicity of the EtherCAT network infrastructure. Utilizing the data and physical layers of the IEEE 802.3 standard and a simple ring topology, each slave in the system has an input and output Ethernet port for connectivity. The optical lens production chain can be adjusted to accommodate more capacity as needed.

Intellectual property protection is now possible while still leveraging the advantages of in-house automation development. Utilizing an out-of-the-box solution that eliminates the hurdle of developing systems from scratch, the optical lens manufacturer can develop industry-leading automation while protecting their trade secrets.



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ADLINK EtherCAT Solution

ADLINK's EtherCAT solutions offer superior performance hardware and software to support highly synchronized control, providing lens producers' in-house automation teams with the tools to develop new systems quickly and easily. The PCIe-833X EtherCAT master controller, Nu-Step EtherCAT stepper driver, ECAT-4XMO 4-channel motion control high-speed trigger EtherCAT bridge, and EU series EtherCAT slave system and modules were used for the optical lens production line.

PCIe-833X EtherCAT Master Controller

PCI Express® x1 EtherCAT motion controller, with 64-axis motion and 10,000 I/O point control, 250μs cycle times, various EtherCAT slave options, and a dedicated emergency stop input. Application-ready function library for easy motion and I/O control included. ADLINK MotionCreatorPro 2 for Microsoft® Windows allows complete EtherCAT motion and I/O configuration and function evaluation.

Nu-Step Driver

An EtherCAT stepper driver with motion control commands, feedback data and parameters. Combined with the internal setting comparison trigger function, the system can meet various process control requirements and supports up to 250μs cycles. Supports digital input and output for more accurate, safer, and faster process procedures.

ECAT-4XMO 4-Ch Motion Control and High-Speed Trigger EtherCAT Bridge

Four-channel EtherCAT slave module with high-speed position comparison trigger and encoder re-drive function. Supports 4-axis motion control with bridge function between EtherCAT and non-EtherCAT. Advanced motion control functions include linear, step, servo, direct drive, and AC motors, ideal for various automation applications.

EU Series EtherCAT Slave System and Modules

Modules with state-of-the-art modular construction suitable for small local applications and expansive distributed platforms. The EU system incorporates and controls nearly any type of I/O device. Operates from 0°C to 55°C, is fully compliant with the EN 61131-2 standard for shock and vibration and EN 61000-6 for heavy industrial EMC protection, and includes an emissions certificate.

ADLINK—The Automation Expert

ADLINK Technology Inc., with years of market-proven expertise in measurement and automation technologies, provides a leading range of industrial automation products empowering motion control, machine vision, data acquisition, I/O control, and intelligent computing platforms. Superior domain know-how and field experience help us meet and exceed customer needs, with a wealth of highly integrated automation solutions enabling real-time I/O and motion control, backed up with reliable one-stop service. ADLINK consistently delivers value by overcoming a wide variety of industrial challenges, with proven platforms optimizing operations, driven by a commitment to long-term sustainability and intelligent manufacturing design.

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Head Office

ADLINK Technology, In c.
No. 66, Huaya 1st Rd., Guishan Dist.,
Taoyuan City 333411, Taiwan
Tel : +886-3-216-5088
Fax: +886-3-328-5706

www.adlinktech.com

Worldwide Offices

Ampro ADLINK Technology, Inc.
6450 Via Del Oro, San Jose, CA 95119-1208, USA
Tel: +1-408-360-0200
Toll Free: +1-800-966-5200 (USA only)
Fax: +1-408-360-0222
Email: info@adlinktech.com

ADLINK Technology (China) Co., Ltd.
上海市浦东新区张江高科技园区芳春路300号 (201203)
300 Fang Chun Rd., Zhangjiang Hi-Tech Park
Pudong New Area, Shanghai, 201203 China
Tel: +86-21-5132-8988
Fax: +86-21-5192-3588
Email: market@adlinktech.com

ADLINK Technology Beijing
北京市海淀区上地东路1号盈创动力大厦E座801室 (100085)
Rm. 801, Power Creative E, No. 1 Shang Di East Rd.
Beijing, 100085 China
Tel: +86-10-5885-8666
Fax: +86-10-5885-8626
Email: market@adlinktech.com

ADLINK Technology Shenzhen
深圳市南山区科技园南区高新南七道数字技术园A1栋2楼C区(518057)
2F, C Block, Bldg. A1, Cyber-Tech Zone, Gao Xin Ave. Sec. 7 High-Tech Industrial Park S.,
Shenzhen, 518054 China
Tel: +86-755-2643-4858
Fax: +86-755-2664-6353
Email: market@adlinktech.com

ADLINK Technology Singapore Pte. Ltd.
1008 Toa Payoh North, 07-17/18 Singapore 318996
Tel: +65-6844-2261
Fax: +65-6844-2263
Email: singapore@adlinktech.com

ADLINK Technology Singapore Pte Ltd. (Indian Liaison Office)
#50-56, First Floor, Spearhead Towers
Margosa Main Road (between 16th/17th Cross)
Malleswaram, Bangalore - 560 055, India
Tel: +91-80-42246107, +91-80-23464606
Fax: +91-80-23464606
Email: india@adlinktech.com

ADLINK Technology Japan Corporation
〒101-0045 東京都千代田区神田鍛冶町3-7-4
ユニゾ神田鍛冶町三丁目ビル4F
Unizo Kanda Kaji-cho 3 Chome Bldg. 4F,
3-7-4 Kanda Kajicho, Chiyoda-ku,
Tokyo 101-0045, Japan
Tel: +81-3-5209-6001
Fax: +81-3-5209-6013
Email: japan@adlinktech.com

ADLINK Technology Korea Ltd.
경기도 용인시 수지구 신수로 767 A동 1503호 (동천동, 분당수지유타워) (우) 16827
A-1503, U-TOWER, 767 Sinsu-ro, Suji-gu,
Yongin-si, Gyeonggi-do, Republic of Korea, 16827
Toll Free:+82-80-800-0585
Tel: +82-31-786-0585
Fax: +82-31-786-0583
Email: korea@adlinktech.com

ADLINK Technology, Inc. (Israel Liaison Office)
SPACES OXYGEN, 62 Medinat, Ha-yehudim st
4673300, Herzliya, Israel, P.O.Box – 12960
Tel: +972-54-632-5251
Fax: +972-77-208-0230
Email: israel@adlinktech.com

ADLINK Technology GmbH
Hans-Thoma-Straße 11
D-68163 Mannheim, Germany
Tel: +49 621 43214-0
Fax: +49 621 43214-30
Email: germany@adlinktech.com

Ulrichsbergerstraße 17
D-94469 Deggendorf, Germany
Tel: +49 991 290 94–10
Fax: +49 991 290 94–29
Email: germany@adlinktech.com

ADLINK Technology, Inc. (French Liaison Office)
Bâtiment Thalès - Parc des Algorithmes,
Route de l'Orme des Merisiers,
91190 SAINT AUBIN, France
Tel: +33 (0) 1 60 12 35 66
Fax: +33 (0) 1 60 12 35 66
Email: france@adlinktech.com

ADLINK Technology, Inc. (UK Liaison Office)
First Floor West Exeter House,
Chichester fields Business Park Tangmere,
West Sussex, PO20 2FU, United Kingdom
Tel:+44-1243-859677
Email: uk@adlinktech.com

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