

Article Overview

Automatic end-face detection systems enable high-precision, efficient inspection of optical fiber connectors and modules, identifying defects such as scratches, pits, and contamination with minimal human intervention.

Overview

Automatic end-face detection is a critical process in optical module manufacturing, especially for high-speed transceivers (400G, 800G, 1.6T) and high-density connectors like MT/MPO. These systems use large-field imaging, high-resolution optics, and AI-based analysis to inspect all fiber cores simultaneously, eliminating the need for manual, core-by-core inspection. The technology ensures consistent quality, traceability, and rapid production throughput.

Key Technologies

- o **Imaging and Optics** Modern systems employ large-field optical systems capable of capturing the entire end-face of multi-core fibers in a single image. High-resolution lenses (up to 400X magnification) allow detection of micron-level scratches and defects.
- o **Automatic Focusing and Centering** Automatic end-face detectors integrate auto-focus, auto-centering, and auto-exposure functions, ensuring precise alignment and consistent imaging without manual adjustments.
- o **Defect Detection Algorithms** Advanced inspection software uses algorithms such as difference of min-max ranking filtering (DO2MR) for region-based defects (dirt, oil, pits) and linear enhancement inspector (LEI) for scratches. These methods achieve high detection accuracy (up to 96% for general defects and 89% for scratches) and can be integrated into production equipment for real-time quality verification.
- o **Data Management and Reporting** Automatic systems generate structured inspection reports with visual and numerical data, enabling digital quality traceability and process optimization.

Applications

- o **High-speed optical module manufacturing:** 400G, 800G, 1.6T transceivers
- o **Multi-core connector inspection:** MT, MPO, MMC, SN-MT
- o **Data centers and 5G network deployment:** Ensures reliable optical interconnections
- o **Research and development labs:** Large-field, non-destructive testing of fiber arrays

Advantages

- o **Efficiency:** One-time full-end-face imaging reduces inspection time significantly.
- o **Accuracy:** AI-based algorithms detect micron-level defects reliably.
- o **Automation:** Minimal operator intervention reduces human error.

Automatic end-face detection of optical modules

- o Versatility: Compatible with various fiber types and connector formats.
- o Traceability: Automatic report generation supports quality control and regulatory compliance .

Examples of Commercial Systems

- o FastCheck MT Fully Fiber Endface Inspector: Offers large-field imaging, automatic focusing, centering, and Pass/Fail analysis for multi-core connectors .
- o AutoGet MT Fiber Endface Inspector: Provides full-scenario intelligent inspection with micron-level defect detection and ergonomic handheld operation .
- o HTO-7000B Integrated Optical Fiber End Face Detector: Supports multiple ferrule types with high-resolution magnification and digital image capture for lab and production environments . Automatic end-face detection has become essential for high-volume, high-precision optical manufacturing, enabling faster production, improved quality, and reliable network performance.

Surface defects on optical fiber end-face, such as scratches, cause heavy loss and low data-transfer rate. Therefore, the inspection

EASYCHECK Integrated Fiber End-face Visual Inspector Easycheck is an integrated fiber endface inspector developed by

As stated before, scratches are difficult to be detected in optical fiber end faces because of their special characteristics. Generally

Automatic optical inspection :SmartCheck and FastCheck Pro fully automatic end face detectors use automated algorithms for image

With support for a broad range of ferrule types--including single-core, multi-core, MPO/MTP, SMA-905, and even

Find the Desktop End Face Inspector That's Right For You EasyCheck V2 Digital Fiber Endface Inspector Next-gen all-digital fiber

Increasing deployment of optical fiber networks and the need for reliable high bandwidth make the task of inspecting

Automated end-face inspection systems--using high-resolution cameras, precision lenses, and dedicated

AutoCheck is the first intelligent integrated fiber end-face inspector developed by Dimension Technology.

Automatic end-face detection of optical modules

With the advantages of

The FastCheck is an intelligent face detector for R&D, mainly for the components and modules for face detection; automatic centring,

The FA-1 fiber array end face detector is an end face detection equipment developed by Dimension Technology for fiber array design

EasyGet2 is a handheld fiber end face detection device developed by Dimension Technology, used to detect various fiber

AutoGet MT Fiber Endface Inspector- Product Overview With the breakthrough progress of CPO (co

The method can be used to detect defects such as oil, dust, impurities, dents, and scratches on fiber optic end faces.

Therefore, the inspection of optical fiber end face defect cannot be neglected. Most optical fiber defect detection

Currently, most manufacturers still use manual visual observation under a traditional microscope for fiber end-face

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