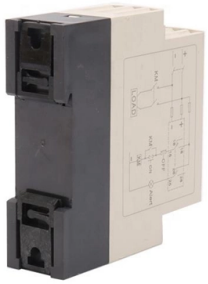
Dispensing Process for Optical Modules



Overview

The fully automatic dispensing system is constructed through the construction of a mechanical structure, the selection of optical equipment, and the debugging of the control system.

Key Takeaways

The optical module dispensing process involves precise application of adhesives to secure optical components, often using automated systems to ensure alignment, repeatability, and high-quality performance. Overview of the ProcessThe dispensing process is a critical step in optical module assembly, ensuring that lenses, sensors, and other optical components are accurately positioned and permanently fixed. In modern optical modules, such as those using the COB (Chip-on-Board) process, dispensing is used to apply adhesives for die bonding, wire bonding, and optical coupling.

Proper dispensing directly affects module performance, including optical power, receiver sensitivity, and alignment accuracy.

Key Steps in Optical Module Dispensing

Die Bonding: Adhesive, often conductive silver or UV-curable, is applied to the PCB at designated positions. Optical and electrical chips are placed on the adhesive, and high-temperature baking secures them permanently. Wire Bonding: Gold wires are bonded between chips and PCB pads.

Adhesive may be used to encapsulate and protect the wires, ensuring mechanical stability and electrical integrity. Optical Coupling: Precision lenses are mounted to align with light-emitting components like VCSELs.

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V adhesive is first used for temporary fixation, followed by permanent curing with black adhesive and high-temperature baking. Misalignment or improper adhesive application can reduce optical efficiency and module reliability.

Automation and Precision

Manual dispensing often leads to variability in adhesive volume and placement, which can compromise module quality. Automated dispensing systems, often based on machine vision, improve accuracy and repeatability. These systems use image processing to identify dispensing areas, calculate optimal paths, and control adhesive volume precisely.

Tolerances can be as low as 0.02 mm, and efficiency improvements of 20–30% are achievable. Closed-loop control ensures consistent adhesive application, critical for high-resolution optical modules.

Adhesive Considerations

Volume Control: Excess adhesive can cause overflow or misalignment, while insufficient adhesive may lead to weak bonding. Curing: UV or thermal curing ensures the adhesive sets correctly, maintaining optical alignment and mechanical stability. Material Selection: Adhesives must be compatible with optical components and withstand thermal and mechanical stresses during module operation.

Summary

The optical module dispensing process is a combination of precise adhesive application, component alignment, and curing. Automation and machine vision technologies are increasingly used to enhance accuracy, reduce variability, and improve production efficiency. Proper execution of this process is essential for achieving high-performance optical modules with reliable optical power and receiver sensitivity.

Article Content

Fully Automated Dispensing System Based on Machine Vision

The fully automatic dispensing system is constructed through the construction of a mechanical structure, the selection of optical equipment, and the debugging of the control system.

Optical Module: A Comprehensive Analysis from Source to Terminal

The end-to-end process from demand to the completion of optical module design. This article descibes the end-to-end manufacturing process of optical modules, starting from customer

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Precision Dispensing for High-Precision Assembly

To ensure a consistent, high-quality dispensing process, we equip our machines with automated calibration and cleaning functions. These systems monitor the dispensing process and ensure that

Glue Dispensing in Fine-Pitch LED Module Production: A Process

This article is written for process engineers and production managers who are either designing new LED module lines or troubleshooting yield problems on existing ones.

Camera Module Dispensing

The entire optical stack — lens barrel, actuator (VCM), IR-cut filter, image sensor and housing — is held together almost exclusively by precision-dispensed adhesives. Dispensing is therefore one of the

Jet Dispensing

Using jet dispensing, components such as capacitive or piezoelectric sensors, heating and lighting elements, as well as signal and contact lines, can be directly printed onto various

Introduction To The COB Process For Optical Modules

The process flow is as follows: first, the equipment identifies the designated die bonding positions on the PCB. A dispensing needle then applies an appropriate amount of silver adhesive to

Introduction To The COB Process For Optical Modules

It can perform automatic coupling and dispensing, significantly improving the overall module manufacturing efficiency. Figure 3 Optical Coupling Diagram Moduletek operates its own die

Every Stage of Optical Device Production | Anritsu America

All processes ranging from upstream wafer growth to device assembly, packaging, inspection, and shipping are handled in the same building to maintain smooth production featuring excellent

Optical Dispensing | Springer Nature Link

The Geneva Lens Measure (GLM) is a valuable device used in optical dispensing to measure the surface dioptric power of lenses, . It is a mechanical dial indicator; by understanding

Dispensing 101

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I''ve seen the optometrist have to troubleshoot patient glasses, or do the adjustments and dispensing themselves. In order to make these pick-ups smooth and efficient, without taking too

Ophthalmic dispensing | PPTX

The document discusses the process of optical dispensing, including defining optical dispensing, measuring frames and lenses, selecting frames based on facial shapes, lens materials and coatings,

Modular Dispensing for Line Versatility & Precision | XTPL

Instead of causing the shutdown of an entire production line, a faulty module can be replaced or serviced individually, minimizing disruption. Although not exclusive to modular systems,

Optical Module Production Technical Requirements

This article focuses on the key points of optical module processing and manufacturing process control, and how to manage and control such products from the design, technical, and

Optical Module PCB: The Ultimate Guide to Design, Fabrication, and ...

This guide serves as an in-depth resource for engineers, designers, and project managers involved in the development of optical module PCBs. It will explore the complete product lifecycle, from design

Jet Dispensing

Motivation Jet dispensing is an additive manufacturing technology that allows functional fluids to be applied precisely and flexibly on flat or three-dimensional surfaces without the use of tools, stencils,

Epoxy Dispensing Explained

Errors in epoxy processes (mixing, dispensing / application, curing schedules, etc.) can lead to premature bond failures which negatively impact the reliability of any cable assembly. In

The Most Comprehensive Guide Of Optical Modules

Explore the ultimate guide to optical modules. Learn types, functions, performance metrics & how to choose the right module for your fiber network.

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This document is for preliminary research. Verify specifications against current standards, product documentation and project requirements.

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