

LAIRD REESE SNOWDEN

Principal Systems Architect | Technical Director | Executive Engineering Leader

Technical Project Director | Complex Laser & Facility Integration | Systems Engineering

Kyle, TX / Albuquerque, NM | 512-210-9786 | larsnow1@aol.com

Independent Research:

<https://gemyndinstitute.com>

Technical Curriculum Vitae & Engineering Impact Portfolio:

gemyndinstitute.com/technical-curriculum-vitae/

Previously held U.S. Department of Defense SECRET security clearance.

EXECUTIVE POSITIONING

Accomplished technical project and systems-integration leader with extensive experience bringing complex laser, electro-optical, controls, electrical, mechanical, thermal, facility, and test workstreams into integrated, verifiable operating systems. Established and led three multidisciplinary engineering laboratories; directed system bring-up, installation, commissioning, qualification, vendor coordination, and technical risk retirement for advanced U.S. Directed Energy, semiconductor, and silicon-photonics programs. Skilled at aligning specialists and stakeholders across organizational boundaries while maintaining the integrated technical and execution picture.

Technical Project Execution: Integrated planning, requirements and interface management, procurement coordination, installation sequencing, subsystem readiness, commissioning, configuration control, risk retirement, stakeholder reporting, and multidisciplinary execution.

SELECTED HIGH-IMPACT ACHIEVEMENTS

- **Bell Labs — Manufacturing Economics:** Developed cross-domain semiconductor manufacturing analytics integrating wafer/process/probe/final-test data, neural-network methods, and production economics; helped transform approximately \$500M in annual semiconductor sales into approximately \$250M annual net profit.
- **Bell Labs — GaAs Foundry Recovery:** Selected to lead recovery and production bring-up of a multi-billion-dollar GaAs SARGIC III-V fabrication capability after prior transfer efforts failed; achieved approximately 95–98% first-lot wafer yield across the initial 12-wafer production run and established the manufacturing foundation for SONET chipset production.
- **Bell Labs — SONET Test Architecture:** Co-architected production SONET Datacom ATE, reducing production test time from approximately 30 minutes to 8 seconds while identifying that an apparently repeatable ~12 ns jitter result was the tester noise floor and helping extend measurement capability into the required picosecond regime.
- **Silicon Labs — Days to Milliseconds:** Architected on-chip thermal characterization and compensation methodology reducing precision oscillator characterization from several days to approximately 500 milliseconds; established NIST-traceable atomic-clock frequency references across manufacturing and reduced production test time by approximately 85%.
- **MZA — Directed Energy Systems:** Architected and integrated beam-control, electro-optical, precision-motion, embedded-control, power, and safety capabilities supporting HEL TVD, HELIOS, AHEL, ODIN, SBD, BCI-MA2 (500 kW), and BCI-MA3 (1 MW).
- **MZA — Automatic Optical Calibration & Asset Protection:** Architected automatic optical-train self-calibration for Directed Energy beam directors and engineered fail-safe emergency braking protecting approximately 7,000-pound precision beam-director assemblies.
- **Skorpios — Silicon Photonics Manufacturing:** Architected lights-out manufacturing capability integrating nanometer-scale precision motion, robotics, machine vision, automated optical alignment, wafer-level laser characterization, and intelligent process automation.

BREADTH OF ENGINEERING EXPERIENCE

Systems Architecture & Technical Leadership: Multidisciplinary systems engineering, architecture, engineering organizations, laboratory development, concept development, trade studies, verification and validation, root-cause investigation, technology maturation, supplier/customer interface, and New Product Introduction.

Systems Integration, Test & Qualification: Multidisciplinary HW/FW/SW integration, verification and validation, HWIL, test architecture, qualification planning, reliability screening, EMI/EMC, environmental testing, root-cause analysis, corrective action, product qualification, New Product Introduction, production readiness, and manufacturing release

Electro-Optical Imaging & Sensor Systems: VIS, SWIR, and MWIR cameras and detectors; optical-path design, characterization and optimization; acquisition/tracking; sensor integration; cueing radar; system-level performance testing; authored organizational best practices for MWIR optical-path design and implementation.

Product Qualification & NPI: End-to-end ownership from concept and first-silicon characterization through qualification planning, verification and validation, reliability screening, execution tracking, production readiness, manufacturing release, and sustained high-volume production supporting millions of units per month.

Directed Energy & Defense Systems: High Energy Lasers, beam directors, beam control, electro-optics, MWIR imaging, acquisition/tracking, precision pointing and stabilization, embedded controls, FPGA/PLC systems, power electronics, system integration, technical risk retirement.

Semiconductor Manufacturing & Manufacturing Intelligence: GaAs/III-V fabrication, wafer probe, automated test equipment, mixed-signal/RF test, yield and profit optimization, neural-network analytics, reliability engineering, failure analysis, process characterization, and high-volume manufacturing.

Silicon Photonics & Precision Automation: Nanometer-scale motion control, robotics, machine vision, automated optical alignment, wafer-level laser test and aging, fiber/waveguide coupling, optical characterization, and lights-out manufacturing.

RF, Microwave & Electronic Warfare: Microwave filter design, RF instrumentation, automated RF test, signal analysis, satellite communications, high-frequency wafer probing, environmental qualification, and defense electronics.

Precision Measurement & Test Architecture: NIST-traceable frequency references, picosecond-domain timing/jitter measurement, mixed-signal ATE, automated characterization, statistical analysis, thermal characterization, reliability, and qualification.

Artificial & Synthetic Intelligence: Neural networks, manufacturing analytics, cross-domain knowledge integration, human-machine collaborative intelligence, cognitive architectures, Synthetic Intelligence Formation, and multidisciplinary systems research.

PROFESSIONAL EXPERIENCE

GEMYND INSTITUTE

Founder & Principal Researcher | 2025–Present | Albuquerque, NM

- Founded an independent research institute focused on Synthetic Intelligence, cognitive architectures, systems engineering, engineering convergence, manufacturing intelligence, governance systems, and civilization-scale infrastructure.
- Developed systems-level concepts for sustained lunar infrastructure, including robotic excavation and subsurface habitat architectures using lunar regolith for environmental shielding and long-duration surface operations.
- Author multidisciplinary engineering and technology white papers; technical thought leadership has reached a large global professional audience through LinkedIn, ResearchGate, Academia.edu, Substack, and the Gemynd Institute.

MZA ASSOCIATES CORPORATION

Principal Systems Architect – Directed Energy Systems | 2019–2026 | Albuquerque, NM

- Led system-level hardware and electro-optical integration, test, verification, and debug across beam control, MWIR imaging, fast steering mirrors, servo systems, fiber-optic gyros, FPGA/PLC controls, power electronics, thermal systems, precision mechanics, embedded software, and laboratory environments supporting advanced U.S. Directed Energy programs.
- Established and led three multidisciplinary engineering laboratories performing system-level hardware and electro-optical bring-up, integration testing, verification, debug, and root-cause analysis across hardware, firmware, software, optics, precision motion, embedded controls, power, and thermal domains supporting advanced U.S. Directed Energy systems.
- Developed a high-precision electro-optical positioning/manipulation system with sub-micron positioning capability for optical assembly, characterization, alignment, and calibration.
- Defined and executed system-level verification, qualification, and pre-reliability testing across multidisciplinary Directed Energy hardware, including stress, soak, power-cycle, thermal, motion-control, electro-optical, power, and integrated-system testing to identify and retire technical risk before higher-level integration.
- Led electro-optical imaging and sensor engineering across VIS, SWIR, and MWIR domains, including camera/detector evaluation, optical-path characterization and optimization, acquisition/tracking architectures, sensor integration, system-level performance testing, and cueing-radar trade studies; authored organizational best practices for MWIR optical-path design and implementation.
- Performed sensor and system trade studies supporting electro-optical tracking and acquisition architectures, including camera/detector selection and cueing-radar evaluation for advanced Directed Energy systems.
- Led technical trade studies, subsystem/vendor evaluations, acquisition decisions, government/customer interfaces, and technical risk-reduction activities across advanced Directed Energy programs.

SKORPIOS TECHNOLOGIES

Principal / Senior Optoelectronics Engineer | 2016–2019 | Albuquerque, NM

- Architected precision automation and manufacturing systems for silicon photonics, integrating robotics, servo control, machine vision, optical feedback, automated test, software, and nanometer-scale positioning.
- Defined and executed system-level pre-reliability and qualification testing for silicon-photonics and electro-optical systems, including stress, soak, power-cycle, laser aging, thermal-cycle, and noise-susceptibility testing; developed test configurations, procedures, interfaces, and corrective-action approaches.

- Led system-level EMI/EMC pre-compliance qualification for silicon-photonics systems, including EMI/EMC pre-scan, SI/PI margin evaluation, and noise-susceptibility testing; identified and coordinated the external test facility, defined qualification requirements and test procedures, designed the equipment interface and cable architecture, and supported test execution, troubleshooting, and corrective action.
- Developed wafer-level laser characterization/aging, optical alignment, OTDR diagnostic capability, and full-wafer parallel test/aging concepts to improve throughput, scalability, capital utilization, and manufacturing economics.

SILICON LABORATORIES

Principal Test Systems Architect / Senior Test Development Engineer | 2003–2013 | Austin, TX

- Architected complete semiconductor production test infrastructures from first-silicon characterization through domestic and offshore high-volume manufacturing using Teradyne J750 ATE, precision instrumentation, automated calibration, statistical analysis, and adaptive multi-site testing.
- Provided data-driven Go/No-Go recommendations at product qualification and manufacturing-release milestones using characterization results, reliability data, test coverage, yield analysis, and statistical process capability (Cp/Cpk); authored product definitions, test and conformance reports, qualification documentation, and test-coverage reports supporting production release.
- Owned New Product Introduction qualification and production-readiness activities from first-silicon characterization through product qualification, manufacturing release, offshore transfer, and sustained high-volume production supporting millions of units per month; defined qualification requirements, test coverage, execution plans, readiness criteria, and release decisions.
- Conducted ESD damage forensics using X-ray inspection and advanced semiconductor analysis techniques to identify physical failure mechanisms and drive corrective action during product development and qualification.
- Developed and executed semiconductor qualification and reliability methodologies including thermal cycling, stress testing, accelerated life testing, power/operating-condition characterization, ESD, latch-up, IDDQ, Cp/Cpk, three-lot qualification, and four-corner characterization supporting production release for New Product Introduction.
- Performed advanced semiconductor failure analysis and reliability engineering including SEM/TSEM, FIB, Auger, ESD, latch-up, IDDQ, Cp/Cpk, qualification, and difficult NVM startup/root-cause investigations.

AT&T BELL LABS / LUCENT / AGERE

Systems Architect / Technical Leader | 1988–2003 | Reading, PA

- Led multidisciplinary semiconductor manufacturing, automated test, manufacturing intelligence, reliability, and new-product introduction supporting high-speed fiber-optic communications and GaAs/III-V technologies.
- Performed advanced semiconductor failure analysis using SEM/TEM electron microscopy, Energy-Dispersive X-ray Spectroscopy (EDX), Auger Electron Spectroscopy, electron-beam circuit probing, active-die electrical probing, and device-physics analysis to isolate manufacturing, design, and reliability failure mechanisms.
- Led product and manufacturing qualification/readiness activities for advanced GaAs and SONET technologies from engineering development through fabrication, characterization, automated test, qualification, production release, and high-volume manufacturing.
- Established an internal active-die characterization and failure-analysis laboratory enabling direct probing and analysis of operating semiconductor devices for design debug, root-cause investigation, reliability analysis, and manufacturing problem resolution.
- Co-developed membrane probe technology with Cascade Microtech; developed advanced millimeter-wave wafer probing, SONET Datacom ATE, production software, manufacturing databases, and neural-network yield/profit analytics.
- Applied accelerated life testing, Arrhenius analysis, electromigration, TDDb, failure analysis, and device-physics methods to improve manufacturing robustness and long-term reliability.

AMERICAN ELECTRONICS LABORATORIES (AEL / COBHAM)

RF Systems Engineer – Electronic Warfare | 1986–1988 | Lansdale, PA

- Designed microwave/RF hardware and automated test systems for Electronic Warfare and satellite communications, including a ten-band reflective microwave filter that achieved first-pass qualification, RF mixer spurious analysis, VSWR instrumentation, and field diagnostic equipment.
- Performed environmental qualification, manufacturing/root-cause analysis, reliability engineering, and automated hybrid-memory testing for mission-critical defense electronics.

RETS COLLEGE

Adjunct Professor – Electrical Engineering & Mathematics | 1986–1987 | Newtown Square, PA

- Invited to join the faculty following graduation with a 4.0 GPA; taught electrical engineering theory, circuit analysis, applied mathematics, and engineering fundamentals while working full-time in Electronic Warfare engineering.

EDUCATION, PROFESSIONAL DEVELOPMENT

- RETS College — Electronics / Electrical Engineering curriculum; graduated with 4.0 GPA and highest honors; appointed Adjunct Professor immediately following graduation.

- Advanced professional education through Bell Laboratories and AT&T management/MBA development programs; semiconductor manufacturing, reliability, failure analysis, statistical process control, advanced test development, neural networks, and artificial intelligence applications.