

Engineering Precision. Maximizing Industrial Uptime.

Trinex Engineering is a premier technology and engineering solutions provider specializing in vacuum furnace services, control panel fabrication, industrial automation, thermal calibration, and turnkey engineering projects for high-precision manufacturing industries.

99.4%

UPTIME DELIVERED

150+

FURNACES SERVICED

24/7

FIELD SUPPORT

100%

AMS/CQI COMPLIANCE

EXECUTIVE OVERVIEW

Partnering for Operational Excellence

In modern industrial manufacturing, heat treatment and thermal processing represent mission-critical stages where precision and reliability directly dictate product integrity. Trinex Engineering bridges the gap between complex thermal science and everyday operational efficiency.

By offering end-to-end capabilities—spanning custom vacuum furnace retrofitting, automated control system integration, complete turnkey plant installations, and comprehensive Annual Maintenance Contracts (AMC)—we empower heat treaters, aerospace contractors, and automotive component manufacturers to achieve zero unplanned downtime and flawless quality standards.

"Our mission is to eliminate thermal processing bottlenecks and deliver turn-key engineering solutions that guarantee quality, safety, and continuous operational profitability."

About Us & Strategic Vision

Trinex Engineering was established to address the critical need for highly specialized, responsive, and quality-driven engineering support in thermal processing and industrial automation. Headquartered in Bangalore, India, with expanding operations globally, our team combines decades of specialized metallurgical, electrical, and control systems expertise.

Engineering Rigor

Every furnace overhaul, control algorithm, and mechanical connection is executed using strict analytical methodologies and empirical validation.

Uncompromising Quality

We adhere rigorously to international aerospace and automotive heat treatment standards, including AMS 2750 and CQI-9.

End-to-End Partnership

From initial thermal audit and system design through installation, commissioning, and round-the-clock maintenance support.

CORE PHILOSOPHY

Built on Precision, Pace, and Process

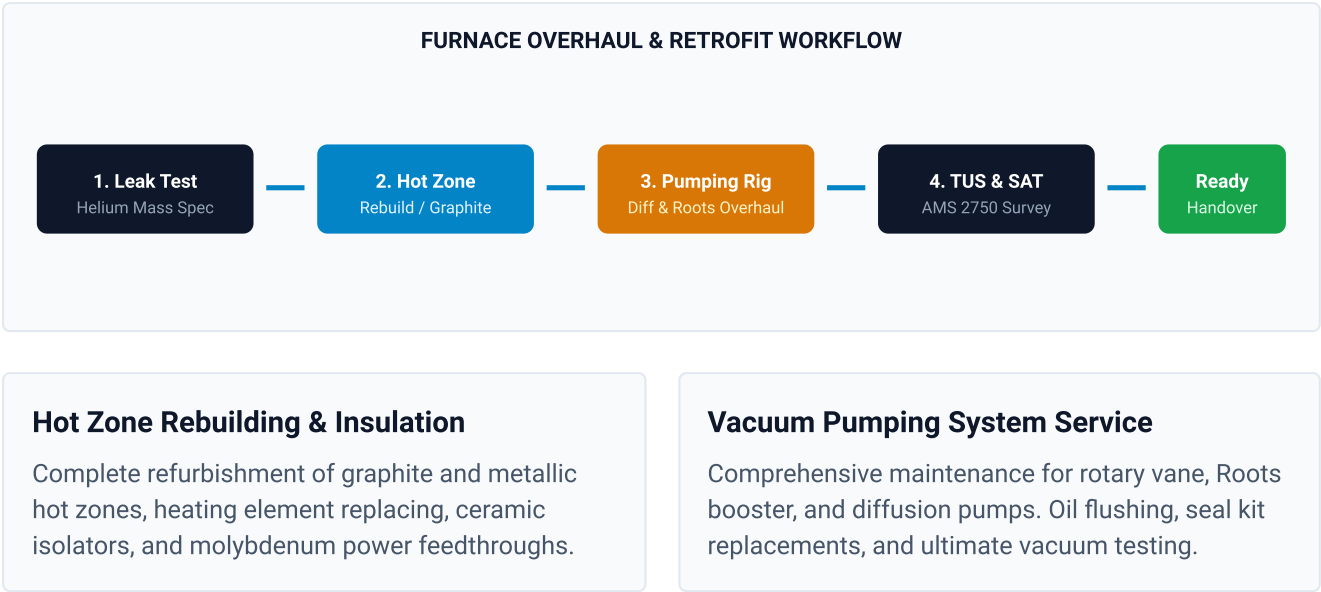
We understand that thermal equipment breakdowns result in high costs and delayed delivery schedules. Therefore, Trinex Engineering operates under a structured field response protocol. We do not merely repair equipment; we analyze failure modes, optimize hot zone performance, and upgrade control architectures to prevent future breakdowns.

Vision Statement

To become the most trusted global engineering partner for thermal processing automation, vacuum furnace services, and turnkey industrial installations—recognized for technical excellence, rapid execution, and sustainable innovation.

Vacuum & Atmosphere Furnace Engineering

Trinex Engineering offers complete engineering and maintenance solutions for vacuum furnaces and controlled-atmosphere heat treatment equipment. Whether dealing with high-vacuum hardening, bright annealing, vacuum brazing, or low-pressure carburizing (LPC), our technical team maintains and optimizes your furnace systems.



Industrial Automation & Control Panel Engineering

Modern industrial operations require continuous control, precise recipe management, and automated safety interlocks. Trinex Engineering designs, builds, and retrofits custom electrical control panels and automation software tailored to furnace systems, thermal equipment, and automated machinery.

System Component	Legacy Baseline	Trinex Modernized Solution	Operational Benefit
PLC Architecture	Obsolete relay logic / legacy PLC	Siemens S7-1500 / Allen-Bradley CompactLogix	Faster response & fault diagnostics
HMI / SCADA	Analog pushbuttons & dials	Multi-touch IPC with batch logging	Full traceability & digital records
Temperature Control	Single-loop analog controllers	Multi-zone PID loop with auto-tuning	Tight uniformity ($\pm 3^{\circ}\text{C}$)
Safety Interlocks	Basic hardwired trips	SIL-3 rated fail-safe safety PLCs	Full compliance & personnel safety

CUSTOM SOFTWARE DEVELOPMENT

SCADA & Recipe Management Systems

We build custom SCADA software interfaces that enable operators to create complex thermal recipes, track historical vacuum/temperature curves, trigger automated alarms, and export full batch reports required for aerospace and automotive quality audits.

Control Panel Fabrication Standards

All control panels are built in-house adhering to IEC and UL-508A specifications, using premium components (Schneider, Siemens, Phoenix Contact) with full schematic documentation and loop checking before dispatch.

Turnkey Plant & Field Installation Capabilities

Relocating, expanding, or installing a new heat treatment line involves complex multi-disciplinary logistics. Trinex Engineering offers turnkey execution—taking full ownership of equipment unloading, positioning, utility piping, electrical cabling, and final site commissioning.

1. Heavy Rigging & Positioning

Safe unloading, precision shifting, leveling, and anchoring of heavy vacuum vessel structures, quenching tanks, and auxiliary skids.

2. Process & Utility Piping

Complete installation of cooling water loops, inert gas headers (Nitrogen, Argon), pneumatic air lines, and vacuum utility lines with pressure testing.

3. Electrical Cabling & Busbars

Main power feeder distribution, heavy cable tray installations, motor control wiring, sensor signal shielding, and main earth grounding grid connections.

4. Testing & Commissioning

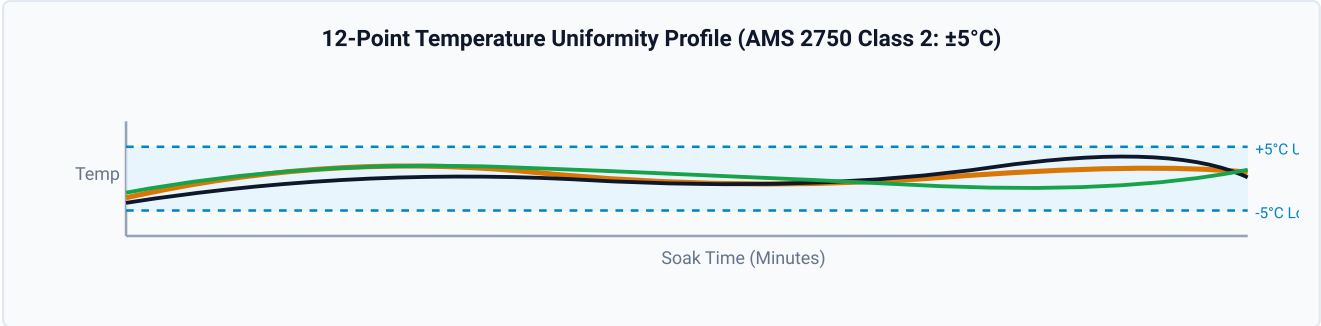
Cold testing, vacuum drop-rate verification, hot dry-runs, temperature calibration, process tuning, and full operator training prior to handover.

Single-Point Project Accountability

By entrusting turnkey installation to Trinex Engineering, plant managers avoid contractor misalignments. Our dedicated project managers coordinate all mechanical, electrical, and automation disciplines under one unified timeline.

Thermal Calibration, TUS / SAT & Compliance

Compliance with rigorous heat treatment specifications is essential for critical component manufacturing. Trinex Engineering provides comprehensive Temperature Uniformity Surveys (TUS) and System Accuracy Tests (SAT) in accordance with pyrometry standards.



AMS 2750 & CQI-9 Compliance

We supply calibrated field test instruments, thermocouple wire sets, and automated software loggers to perform Class 1 to Class 5 furnace profiling.

System Accuracy Testing (SAT)

Routine verification of furnace control instruments against certified master calibration units to detect sensor drift and prevent out-of-spec batches.

All calibration tools used by Trinex Engineers are traceable to NABL / NIST standards, accompanied by full calibration certification documents upon completion.

06. TECHNICAL INFRASTRUCTURE

Capabilities & Technical Specifications

Trinex Engineering maintains a technical infrastructure equipped with modern diagnostic tools, software platforms, and specialized overhaul instruments designed for field and shop operations.

Category	Equipment / Tooling	Technical Capability & Specification
Vacuum Testing	Helium Mass Spectrometer	Sensitivity down to 1×10^{-9} mbar.l/sec leak detection
Pyrometry & TUS	16-Channel Calibrated Logger	Resolution 0.1°C; complies with AMS 2750 spec
CAD / CAE Software	SolidWorks & AutoCAD Electrical	3D structural modeling & panel schematic design
Automation Tools	Siemens TIA Portal / Rockwell Studio	PLC, HMI, SCADA programming & simulation suites
Power Quality	Fluke Power Quality Analyzers	Harmonic analysis, voltage sag & power factor evaluation
Pumping Rig Shop	Vacuum Pump Test Bench	Complete overhaul & ultimate vacuum testing station

ENGINEERING STANDARDS

Built to Global Industry Codes

Our engineering team designs and executes works in strict alignment with international safety and quality standards, including NFPA 86 (Standard for Ovens and Furnaces), IEC 60204-1 (Electrical Safety of Machinery), and ASME Section IX welding standards for vacuum pressure boundary piping.

Operations Support & Maintenance Contracts (AMC)

Unplanned breakdowns in thermal equipment can halt entire production lines. Trinex Engineering provides structured operational support and Annual Maintenance Contracts (AMC) designed to guarantee continuous machine availability.

Tier 1: 24/7 Field Emergency Response

Rapid deployment of field engineers to resolve unexpected vacuum losses, power control trips, or hydraulic/pneumatic faults.

Tier 2: Scheduled AMC Packages

Planned quarterly or bi-monthly preventative maintenance visits covering leak checks, pump servicing, and electrical terminal tightening.

Tier 3: Dedicated On-Site Support

Deputation of full-time resident technicians to operate and maintain thermal plant lines with zero internal management overhead.

PREVENTATIVE MAINTENANCE PROTOCOL

Proactive Care vs. Reactive Repair

Our AMC clients benefit from structured checklists covering over 85 inspection points on every vacuum furnace system. Regular analysis of oil condition, seal elasticity, resistance value trends on heating elements, and pneumatic valve actuation times allows us to replace wearing components long before catastrophic failure occurs.

Key AMC Benefit

Clients under Trinex Annual Maintenance Contracts report an average 78% reduction in emergency breakdown calls and a 15% improvement in thermal energy efficiency.

Industries & Market Verticals Served

Trinex Engineering serves high-reliability manufacturing sectors where component failure is not an option. Our deep understanding of industry-specific compliance requirements makes us a preferred partner across diverse verticals.

Aerospace & Defense

Vacuum brazing, stress relieving, and solution heat treating of superalloy engine components, turbine blades, and structural landing gear elements meeting NADCAP and AMS 2750 standards.

Automotive & Transmission

Low-pressure carburizing (LPC), gas carburizing, and oil/gas quenching of gears, shafts, and powertrain components with complete CQI-9 pyrometry and batch record integration.

Tooling, Die & Mold Making

Hardening and tempering of high-speed steel (HSS), tool steel dies, and injection molds in high-vacuum gas quench furnaces ensuring distortion-free, bright surface finishes.

Medical Implants & Energy

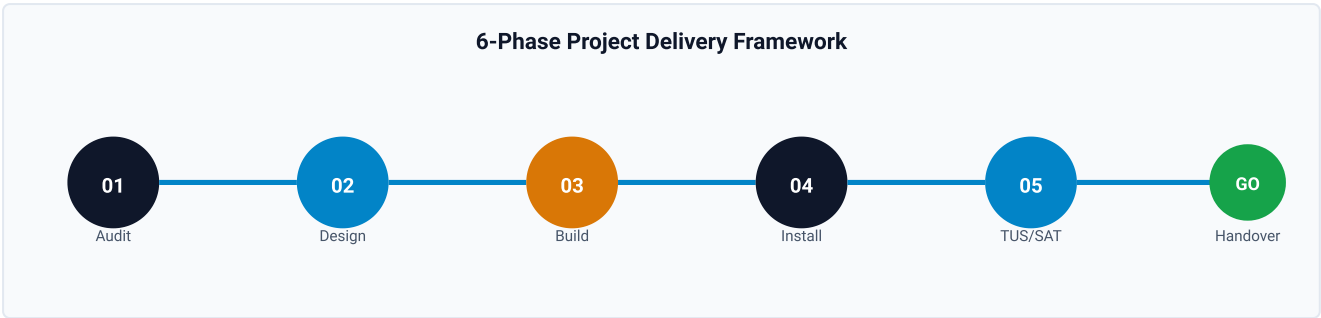
Sintering, vacuum annealing, and diffusion bonding of Titanium and Cobalt-Chrome orthopedic implants, solar cell components, and nuclear valve body forgings.

Cross-Industry Adaptability

Whether you operate a commercial heat treatment shop serving hundreds of varied customers or a captive aerospace heat treat facility, our team adapts to your internal operational workflows.

Turnkey Project Execution Methodology

To ensure project delivery on time and within budget, Trinex Engineering follows a structured 6-phase project management lifecycle equipped with formal review gates.



DETAILED PHASE DESCRIPTION

Every engagement begins with an on-site technical audit and process evaluation. Our design engineering team formulates CAD schematics, bill of materials, and automation control logic. During build and installation, quality hold points prevent cumulative errors. Final commissioning includes client witness testing, safety validation, and hands-on staff training.

Quality Control Gateways

Projects cannot advance to field installation without passing preliminary Factory Acceptance Testing (FAT), ensuring all PLC software loops and panel power distributions are verified off-site.

Sustainability, Safety & Smart IIoT Integration

Trinex Engineering is committed to helping the industrial sector transition toward lower carbon footprints, reduced thermal energy losses, and safe working environments.

Energy-Efficient Hot Zones

Upgrading obsolete ceramic fiber insulation to modern multi-layer graphite felt structures reduces thermal radiation loss by up to 22%.

Smart IIoT Telemetry

Integration of edge IoT gateways for real-time monitoring of power usage, vacuum degradation, and predictive motor vibration analysis.

Zero-Accident Safety Protocol

Strict safety adherence including Lock-Out / Tag-Out (LOTO) procedures, confined space entry protocols, and electrical safety interlocks.

DIGITAL TRANSFORMATION IN HEAT TREATMENT

Predictive Maintenance through Analytics

By connecting furnace control systems to modern cloud or local server dashboards, plant managers receive instant mobile alerts when a vacuum pump draws excessive current or a heating element shows resistance degradation, enabling proactive maintenance during scheduled shifts rather than mid-run batch failures.

Environmental Stewardship

Our closed-loop cooling water system designs minimize industrial water consumption and prevent local thermal pollution, aligning with global ISO 14001 environmental frameworks.

Partner with Trinex Engineering

Leadership Commitment

"We build long-term engineering relationships rooted in transparency, technical integrity, and unwavering support. When you partner with Trinex, our engineering power becomes an extension of your operational team."

— Executive Leadership Team, Trinex Engineering

Headquarters & Technical Facility

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Ready to Upgrade or Service Your Thermal Processing Systems?

Contact our technical sales team today to schedule an on-site thermal audit or request a customized proposal.

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