

Critical Components for Critical Applications



Engineers designing for a zero-tolerance world

From a busy emergency room to the moons of Saturn, Minco's critical components



A critical component of your success™

Success or failure. Profit or loss. Life or death.

When you're working with trade-offs like these, you want absolute confidence in every component that goes into your products. Minco understands that perfectly. We design, manufacture and market critical components for critical applications. Components that precisely fit your needs and deliver extremely high performance. Components that help you minimize risk, and ensure success.

Decades of experience make Minco much more than a components supplier

Minco has been designing and manufacturing critical components since 1956. During the past five decades, we've grown into a global company with four product lines:

- ▼ Thermofoil™ Heaters
- ▼ Flex Circuits
- ▼ Sensors
- ▼ Instruments

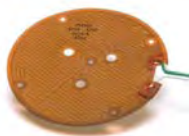
We've developed the unsurpassed ability to design and assemble these products into a single integrated component so you can achieve the highest degree of functional and packaging efficiency. At the same time, we've established working relationships with the design engineering

teams at hundreds of customers, freely sharing our component knowledge and experience. Our inclusive sales process creates win-win opportunities for both Minco and our customers, which shortens your sales cycle and strengthens valuable customer relationships. All of this has made Minco a trusted partner and provider of critical components for the world's most critical applications.

Minco today: global and growing

Minco's engineering and manufacturing plants employ over 850 people worldwide. We have the capacity and infrastructure to support a variety of applications for global customers in diverse markets. Minco's seamless operational capabilities allow us to design and manufacture integrated components from the ground up, which shortens the supply chain and improves our response time.

Minco's products help ensure the success of your critical applications



Thermofoil™ Heaters



Flex Circuits



Sensors



Instruments



Integrated Components

choose Minco

make the critical difference.

Minco's Commitment: TCO and Quality

Minco believes in considering all costs associated with our components. That's why we design and manufacture with total cost of ownership (TCO) in mind to ensure ease of installation, the highest level of quality and reliability, compatibility to a variety of larger control systems, and value-add opportunities for integration and assembly.

Minco is ISO 9001:2000 / AS/EN/SJAC9100 (Registrar: TÜV) certified and we have the capabilities to meet many other quality assurance, process, and product specifications per your requirements.

Let's talk E2E — engineer to engineer

The best way to solve a tough engineering problem is to talk to an engineer who has already solved it.



The E2E Community is a group of Minco design engineers dedicated to providing other engineers like you with application knowledge, education and expertise. There's also the E2E Online Community on the Minco website where engineers from around the world can collaborate in discussion forums, read white papers and find useful engineering tools. When your resources are stretched thin, the Minco E2E Community can help you find the information you need.

Providing critical components to these industries:



Medical Implant Devices



Medical Diagnostics



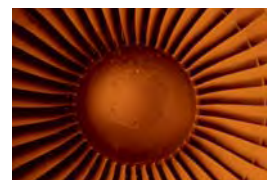
Military and Aerospace



Global Security



Building Automation



Other Industries

For more information on Minco, our critical components, or E2E, please visit www.minco.com

Thermofoil™ Heaters

Precisely applied heat that ensures product performance, even in extreme environments.

Minco's heaters have proven successful in a wide range of industries and critical applications. From packaging equipment to deep-space probes to LCD screens in sub-zero climates, our heaters have performed with total reliability.

Minco's heaters offer precise, rapid, and reliable heat transfer to make your thermal solution straightforward and efficient. Thin and flexible, our heaters are easily installed wherever space is tight, even where there's no room for supporting framework.

And they provide excellent thermal contact in the area where you need it most.

Surprisingly, Minco's custom heaters can be more cost-effective than standard models. Start with our off-the-shelf solutions for experimentation and proof-of-concept testing. Then, we'll work with you to optimize a custom solution.

Heaters are available in a variety of insulation packages with either an etched element (Thermofoil™) or wire-wound element.



Polyimide



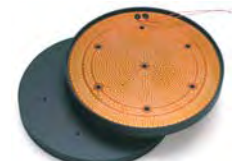
Silicone Rubber



Mica



Optically clear polyester (Thermal-Clear™)



All-Polyimide

We can supply heaters with UL, C-UR, TÜV, CENELEC, and NASA S 311-P-079 certification based on customer specifications.

Flex Circuits

Precision, reliability, and easier installation that runs circles around traditional wiring.

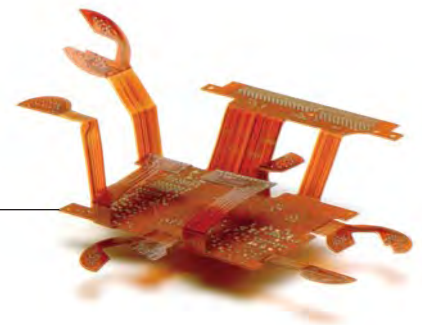
Minco's flexible interconnects and communication coils are used in critical applications around the globe. Whether in implantable medical electronics or designed into ruggedized communication equipment, our flex circuits have the quality and reliability needed in such high performance applications.

Our comprehensive capabilities put the full potential of flex circuit design within your reach. We can furnish single-sided, double-sided, multilayer and rigid-flex circuits. Stiffeners,

pins, connectors and full turnkey electronics packaging are optional and can be integrated into a value-add assembly.

Minco also has the distinctive capability to offer inductive communication coils integrated with flexible circuits.

More importantly, we furnish confidence—in quality, in long-term performance, and in adherence to your specifications. Whether you're looking for a simple interconnect or complex integrated flex/coil package, Minco offers the quality and reliability you need for your critical component.



Flex with Connector



Bare finger terminations



Wire bond IC flex



Flex-Coil™



Surface mount components



Rigid-flex

Minco can build flex circuits to IPC 6013, MIL-P-50884D and other quality and process specifications per customer requirements.

Sensors

How hot, how cold, how humid? Critical applications depend on the input from Minco sensors.



As sensing specialists for half a century, Minco has the expertise and capability to put together temperature sensing solutions for a wide range of applications. Minco manufactures resistance temperature detectors (RTDs), thermocouples, and thermistors in a variety of packages and assemblies, as well as fittings and thermowells.

Built from start to finish with the highest quality and reliability, Minco's sensors reduce your TCO through efficient design and easy installation.

Minco provides hundreds of standard sensors to fill your immediate needs. We can also design and manufacture a custom sensing package built to your exact application specifications. FM, ATEX, 3-A, and other distinguished certifications are available with many of our sensors and assemblies.

- ▼ Probes
- ▼ Probe assemblies
- ▼ Explosionproof assemblies
- ▼ Sanitary sensors
- ▼ Miniature sensors
- ▼ Stator winding detectors
- ▼ Building automation/HVAC /R sensors
- ▼ Thermal-Ribbons™ (thin, flexible sensors)
- ▼ Ceramic elements
- ▼ Precision reference thermometers
- ▼ Humidity sensors

Instruments

Monitoring and control products that take accuracy to the *n*th degree.

Minco's temperature instruments are designed and manufactured to work with and compliment our temperature sensors and flexible heaters. Minco's temperature instruments are made for easy and straight forward installation, and can be specially calibrated for improved system accuracy, even over long distances.



Minco offers temperature and humidity transmitters, PID controllers, monitors and loop powered indicators. We can customize any of our temperature instruments to fit your system's requirements. FM, UL, and CSA certification is available on many of our standard models.

- ▼ Temperature transmitters
- ▼ Humidity transmitters
- ▼ PID controllers
- ▼ Temperature monitors
- ▼ Loop powered indicators

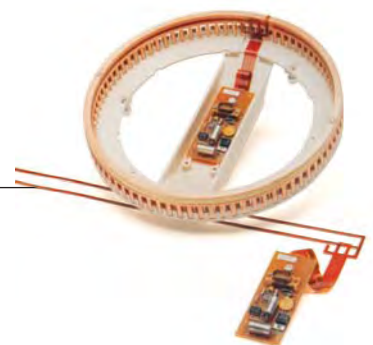
Custom and Integrated Components


Dependable component customization and integration from the people who made the components dependable in the first place.

Minco operates four different product divisions, all coordinated in the same facility for faster, seamless integration that can boost your time-to-market. This makes us unique in our ability to customize and integrate components into turnkey assemblies and complete thermal, sensing and flex circuitry solutions. All of our components can be designed, manufactured, and integrated to perfectly fit your application while providing matched system accuracy.

Minco's customized products provide an affordable solution to meet your exact specifications. We work diligently to build our products with the greatest efficiency and accuracy to meet your critical standards and ensure ROI.

With integrated solutions there is less work on your end, and less that can go wrong. Our integrated assemblies truly lower your TCO because of less front end assembly, easy installation, and unparalleled quality and reliability.





Chamber 1: Paced
Chamber 2: Paced
Prognosis: Success
Flex Circuit: Minco

Medical Implant Devices

A tiny flex circuit helps prevent sudden cardiac arrest. What could be more critical than saving a human life?

Critical Solutions. When it's the difference between life and death, Minco knows your application has to work flawlessly. Our components have proven successful in a range of medical implant devices where quality and reliability are paramount.

Telemetry. Magnetic induction coils are a key communication feature for many medical implant devices. Minco specializes in the design and manufacture of x, y and z plane communications coils and can incorporate piezoelectrics and other components for added value.

Integrated Solutions. Minco has the unique ability to integrate coils with flex circuits and components so that your final package is smaller by reducing insulation and attachments. Our ability to braze coils with flex circuits gives you the assurance of a reliable and secure connection in your critical application.

Investment in Your Application. Minco has invested and continues to invest heavily in technology and machinery for medical implant components. We are your partner in the design and production of your applications. And we're constantly improving our processes to help you deliver the critical quality and reliability that your customers demand.

CRITICAL COMPONENTS USED IN:

- ▼ Pacemakers
- ▼ Defibrillators (ICD)
- ▼ Cardiac resynchronization (CRT)
- ▼ Heart assist/artificial heart
- ▼ Neurological stimulation implants
- ▼ Cochlear implants
- ▼ Infusion drug pumps



Medical Diagnostics

When precise control makes tests more accurate, it gives medical professionals more confidence in your diagnostic instrument.

Design Services. With years of experience designing and manufacturing components for the medical diagnostic industry, our engineers have the expertise to help you design your applications. Done right the first time, we can reduce the design process allowing you to meet your deadlines.

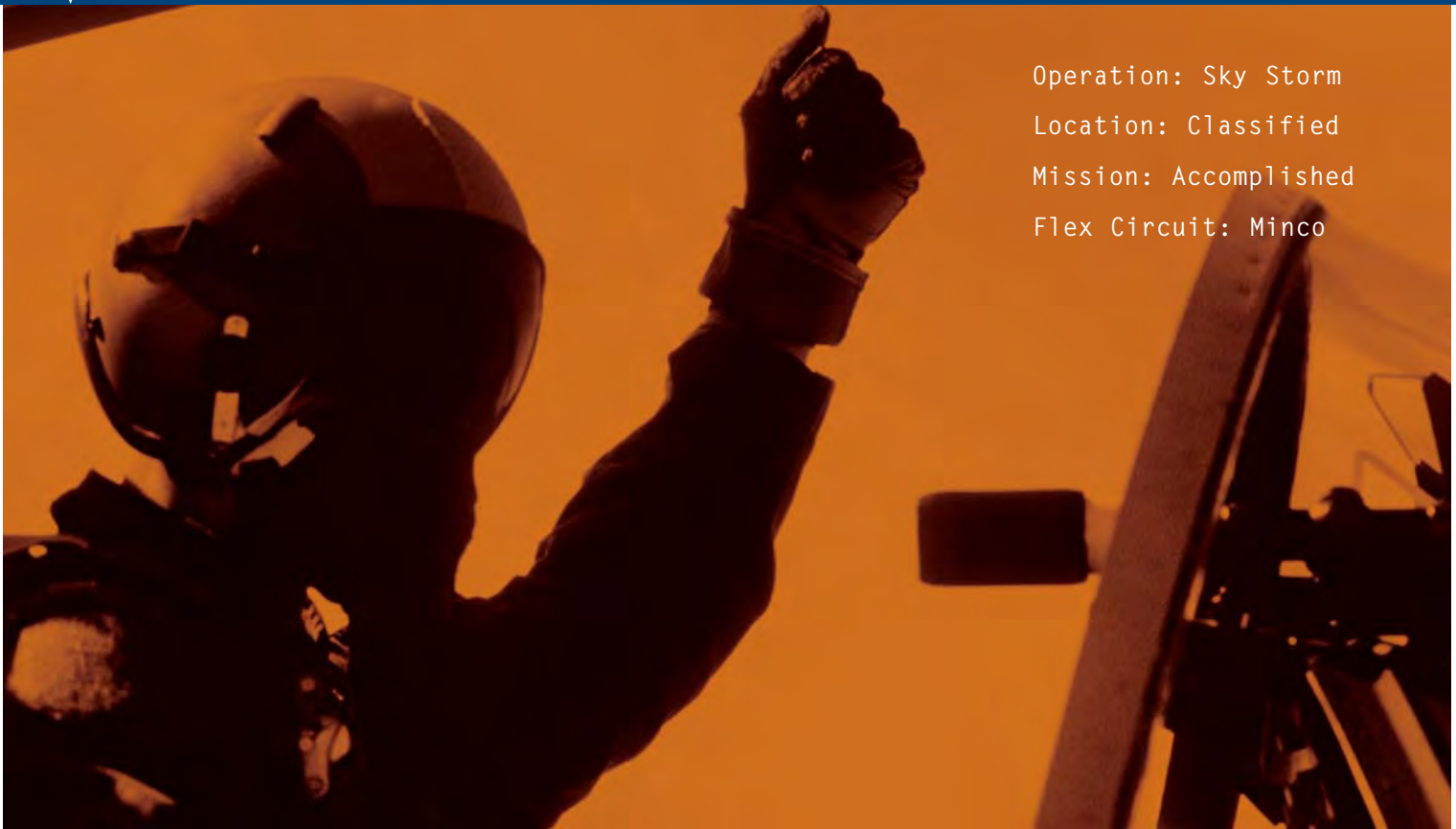
Time-to-Market. Our sales, engineering, and manufacturing processes are set up with your goals in mind. Minco understands the critical time-to-market aspect of your cutting edge business and works to ensure that all aspects of the sales and production cycle transition smoothly.

Reliability and Accuracy. Your products have to work flawlessly because someone's life could depend on it. Minco's components are designed and manufactured with the highest degree of quality, accuracy, and reliability so you won't have field failures. From first article inspection to quality audits, Minco can accommodate your needs and guarantee consistent business practices to ensure the reliability and accuracy of our components.

Integration and Assembly. Minco can integrate our different products for complete thermal solutions, and offer value-add assemblies onto heatsinks or other features of your application. In order to shorten your supply chain and reduce your time-to-market, Minco can be your partner to offer turnkey solutions for your critical application.

CRITICAL COMPONENTS USED IN:

- ▼ In vitro diagnostics
- ▼ In vivo diagnostics
- ▼ Patient monitoring
- ▼ Surgical equipment
- ▼ Respiratory devices
- ▼ Life science



Operation: Sky Storm
Location: Classified
Mission: Accomplished
Flex Circuit: Minco

Military and Aerospace

Mach 2 speeds. Sub-zero temps. At the extreme edge of performance, absolute reliability is critical to mission success.

Custom Solutions. Minco engineers have the expertise to design to your thermal, sensing and flex circuitry needs. Minco has successfully designed thousands of custom solutions for unique Military and Aerospace applications, and our components are spread throughout the world and out of this world.

Reducing the Supply Chain. Our value-add assembly service can help reduce your supply chain. We have the capabilities to integrate our components and provide assembly with other components of your total application, saving your production process time and money. Whether you're looking for a heater with an integrated sensor and controller terminated to flex leads and vulcanized to your heatsink, or just a single component for your application, Minco is the perfect fit.

Extreme Conditions. Military and Aerospace applications require the utmost dependability in harsh conditions with built-in redundancy. Minco is your partner for these types of applications. Highly reliable and rugged, our components can survive the harshest conditions and still work when you need them to — whether it is every two seconds or once every two years.

CRITICAL COMPONENTS USED IN:

- ▼ Helmet mounted displays (HMD)
- ▼ Digital battlefield products
- ▼ Unmanned aerial vehicles (UAV)
- ▼ Rugged laptops and electronic equipment
- ▼ Military communications systems
- ▼ GPS guided munitions and radar systems
- ▼ Satellites
- ▼ Aircraft de-icing applications
- ▼ Battery heaters
- ▼ Commercial avionics products

Baggage: Unclaimed
 Explosive: Detected
 Disaster: Averted
 Thermofoil™ Heater: Minco



Global Security

A trace of chemical. A penetrating scan. Innovative solutions that help protect the world from hidden threats.

Success. Since the inception of the Global Security market, Minco has been designing and manufacturing components and integrated solutions for key applications in the industry. Our thermal solutions and interconnects have been a huge success in the surveillance and scanning products that are constantly introduced to the market.

Accurate, Rugged and Reliable. Our components are made to last. Period. Minco manufactures products so that they are the industry standard and will work consistently, reliably, and accurately in the specified conditions of your application. We know you need your product to work at all times which is why we build all of our components to be the most trusted in the market.

Timely. Minco knows the crucial time constraints you work under. We have sales, engineering, and manufacturing systems in place to provide you quality components, when you need them.

CRITICAL COMPONENTS USED IN:

- ▼ Hazardous chemical detection
- ▼ Surveillance systems
- ▼ Remote location detectors and analyzers
- ▼ Temperature elevation for analytical process
- ▼ Chromatography
- ▼ PCR cycling
- ▼ Biometric scanning
- ▼ Spectroscopy



Outside Temperature: -20°C
 Fresh Air Intake: Mandated
 Controlling Costs: Elementary
 Sensors: Minco

Building Automation

Highly accurate sensors and controls help indoor environments stay comfortable and energy-efficient around the clock.

Critical Environments. Minco offers a large variety of Building Automation sensors made to perform in the most critical of environments. Our engineers have a wealth of experience in designing and manufacturing temperature sensors, sensor systems, and specialty sensors to suit all of your requirements. Whether it is sub-zero or 800°C, Minco is your partner in Building Automation

TCO. Total Cost of Ownership is more and more an essential factor in today's market. Our sensors and sensor/transmitter assemblies are made for easy installation, high reliability, and compatibility with almost any control system. This lets you spend less time and money on field installation and repair, and more time working on new projects.

Matched Accuracy. Our sensor assemblies are available with matched system calibration to give you the greatest accuracy possible. When your critical environment application calls for tight tolerance with incredible accuracy, Minco's Building Automation components are built specifically for your job.

CRITICAL COMPONENTS USED IN:

- ▼ Ultra-low freezers
- ▼ Pharmaceutical and biological labs
- ▼ Clean rooms
- ▼ Hazardous locations
- ▼ Chemical processing
- ▼ Food storage
- ▼ Blood banks
- ▼ HVAC/R

Let Minco make the critical
difference in your applications.

No matter what the industry, you can depend on Minco's decades of design engineering and manufacturing experience to develop the critical components you need to minimize risk and ensure success in your critical applications. Visit us at www.minco.com.

MINCO

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Flex Circuits
Thermofoil™ Heaters
Sensors
Instruments