Medical Interconnect Solutions

Enabling MedTech for the Future

www.EDAC.net

MEDICAL TECHNOLOGIES

Medical technologies, often referred to as MedTech, encompass a broad range of tools, devices, equipment, and procedures that are designed to diagnose, monitor, treat, or improve patient health. MedTech is a vital aspect of modern healthcare, enabling more accurate diagnoses, better treatment outcomes, and improved patient care. These technologies range from simple devices to complex equipment that is integrated with advanced software, including AI. EDAC partners with leading MedTech companies, providing innovative connector solutions that enable them to advance their products globally and improve healthcare.

Advancing healthcare innovation with connectors designed for the evolving needs of tomorrow's medical technologies.

Telemedicine and remote patient monitoring are transforming healthcare by increasing accessibility and continuous care [1]

+8.49% Annually

Digital health is projected to grow at an 8.49% CAGR, with telemedicine and remote patient monitoring driving this expansion. [2]

15+ Million Procedures

Intuitive Surgical's da Vinci system exemplifies the growth and advancement of robotic-assisted surgery, with over 15.4 million procedures performed to date, including 2.2 million in 2023 alone, and more than 9,800 systems installed globally, revolutionizing precision in surgical care. [3]

$750+ Billion By 2029

MedTech is expected to grow at a steady rate of 5.29% annually, reaching over $750 billion by 2029, with medical devices leading the way. [4]

APPLICATIONS

Cardiovascular

External devices and technologies focused on diagnosing and monitoring heart and vessel conditions. Examples include automated external defibrillators (AEDs), ECG machines, and wearable devices like smartwatches.

Communication

Technologies that facilitate the exchange of patient information, consultations, and data between healthcare professionals. Examples include hospital network servers and communication systems.

Diagnostic

Tools and technologies used to detect, identify, and monitor diseases or medical conditions. Examples include stress testing systems, thermometers, diagnostic sets, or diagnostic imaging, which includes MRI systems, ultrasound, X-Ray, and CT scanners.

Emergency Response

Tools and equipment designed for use in urgent care situations, providing rapid diagnosis, treatment, and stabilization of patients in critical condition. Examples include ambulances, delivery drones, external portable assisted devices such as portable ultrasounds, monitors, and CPR.

Infusion Systems

Medical devices that deliver controlled doses of fluids, medication, or nutrients to patients over a set period of time. An example is a pump system or control unit.

Infection Control

Technologies and equipment used to prevent and manage infections, including sterilizers, disinfectant systems, and protective barriers in medical environments. Examples include disinfectant robots, isolation systems, and automated dispensers.

Laboratory

Equipment and tools used for analyzing biological samples, conducting tests, and performing research to diagnose diseases and develop treatments. Examples include PCR machines, blood analyzers, centrifuges, and spectrophotometers.

Mobility

Products that enhance the mobility of individuals with physical impairments. Examples include wheelchairs, walkers, and scooters.

Patient Monitoring

Systems used to continuously track and display vital signs and other critical patient data, providing real-time data to healthcare professionals. Examples include vital sign monitor, central control stations, remote patient monitors, telemetry systems, and integrated wall units.

Rehabilitation

Devices and technologies that assist patients in regaining physical or cognitive function after illness, injury, or surgery. Examples include physical therapy equipment and virtual reality rehabilitation systems.

Robotics

Automated and semi-automated machines that assist in surgery, rehabilitation, and patient care, improving precision, safety, and efficiency in medical procedures. Examples include surgical robots, rehabilitation robots, robotic dispensing systems, dis-infection robots, automated sterilizers, and patient transfer equipment.

Smart Beds & Surfaces

Advanced medical smart beds and surfaces that adjust to a patients needs, track vital signs, and improve overall patient comfort. Examples include hospital beds, operating or surgical beds, and surfaces.

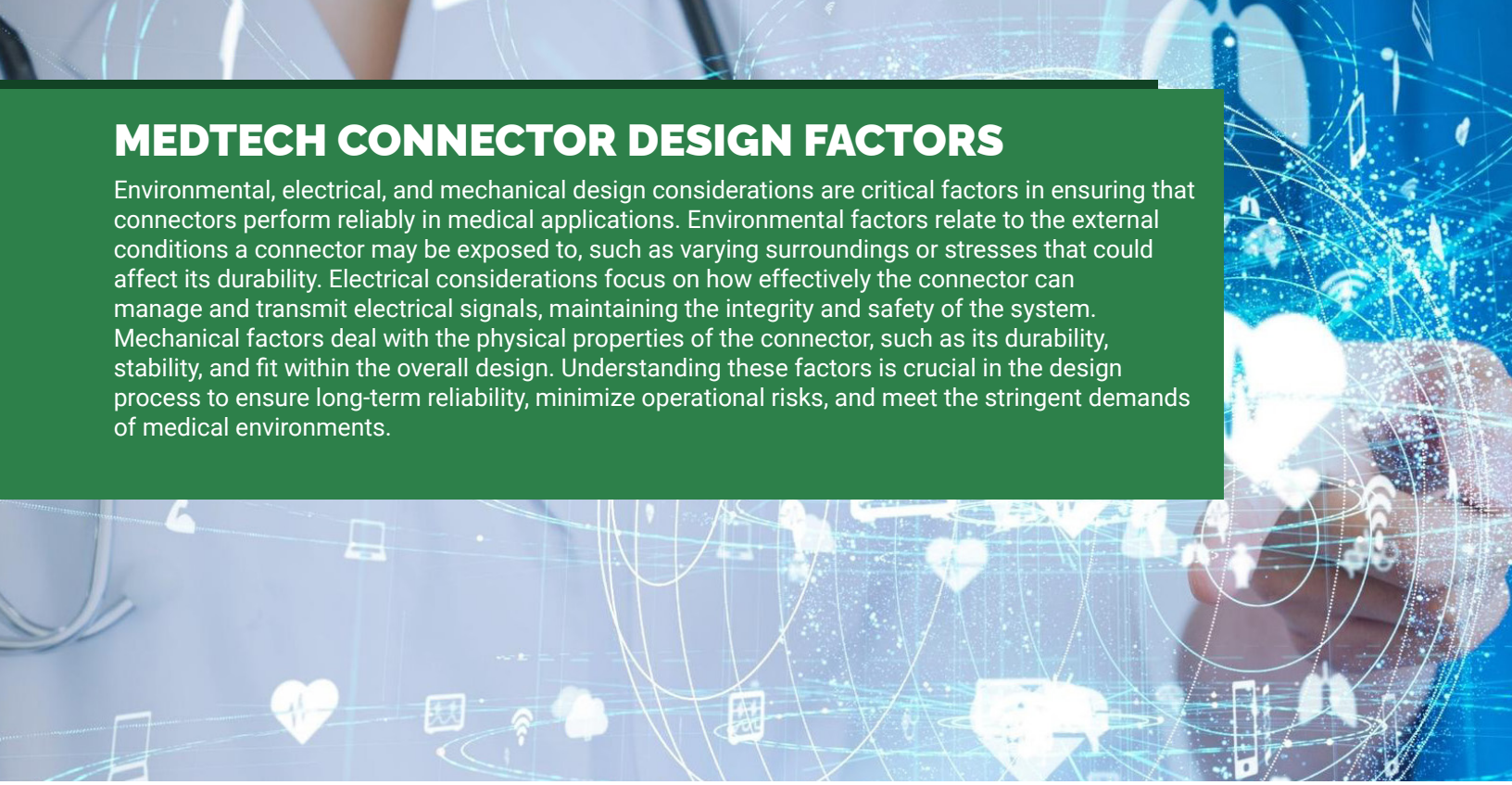
Surgical

Technologies and devices enabling precision during surgical procedures to perform precise and controlled interventions. Examples include lighting, cameras, sterilization and surgical robotics or machines.

Therapeutic

Devices and equipment designed to treat diseases, injuries, or medical conditions. Examples include infusion systems, rehabilitation equipment or robotics, and respiratory equipment.

MedTech is advancing rapidly, with remote patient monitoring wearables enhancing healthcare delivery.



MEDTECH CONNECTOR DESIGN FACTORS

Environmental, electrical, and mechanical design considerations are critical factors in ensuring that connectors perform reliably in medical applications. Environmental factors relate to the external conditions a connector may be exposed to, such as varying surroundings or stresses that could affect its durability. Electrical considerations focus on how effectively the connector can manage and transmit electrical signals, maintaining the integrity and safety of the system. Mechanical factors deal with the physical properties of the connector, such as its durability, stability, and fit within the overall design. Understanding these factors is crucial in the design process to ensure long-term reliability, minimize operational risks, and meet the stringent demands of medical environments.

ENGINEERING DESIGN CONSIDERATIONS

Electrical

EMI/RFI Exposure

Electromagnetic and radio frequency interference (EMI and RFI) can disrupt signal transmission in medical devices. EMI- and RFI-shielded connectors help maintain signal integrity in environments with such interference.

Grounding and Bonding

Grounding and ESD protection are crucial for safety and reliability, preventing electrical faults and static discharge that could damage sensitive electronics in critical environments.

Magnetic Fields

Magnetic fields from devices like MRI machines can interfere with ferrous materials. Non-ferrous connectors ensure reliable operation in magnetic environments.

Power Handling

Medical devices with high power needs must ensure safe and efficient power transmission. High-current connectors designed for low resistance provide reliable power handling.

Signal and Data Requirements

Devices requiring high data transfer rates and signal accuracy must be shielded from interference. High-bandwidth connectors and shielding maintain signal integrity and data performance.

Surge Protection

Power surges can damage sensitive medical equipment. Surge-protected connectors prevent device failure and ensure continuous operation.

Voltage and Current Ratings

Connectors must meet precise voltage and current ratings to prevent overheating and ensure reliable performance, safeguarding sensitive medical equipment in patient-critical environments.

Engaging with EDAC, an experienced connector manufacturer, early in your design process can help address design considerations for your specific application to mitigate risk.

Environmental

Biological Contamination

Medical devices exposed to bodily fluids and pathogens risk contamination. Sealed, sterilizable, and biocompatible connectors prevent contamination and ensure safety.

Chemical Exposure

Frequent cleaning with sterilization agents or disinfectants can degrade materials. It's important to select chemically resistant materials to ensure long-term durability under chemical exposure.

Dust, Debris, and Water

Medical devices can be exposed to dust, debris, and moisture, leading to corrosion or electrical shorts. Sealed connectors with appropriate Ingress Protection (IP) provide protection against contaminants.

Radiation Exposure

Exposure to ionizing radiation in medical imaging can degrade materials. Radiation-resistant connectors help maintain functionality in radiological environments.

Temperature Extremes

High or low temperature environments can lead to material fatigue or failure. Connectors designed with temperature-resistant materials maintain performance across a wide range of conditions.

UV Exposure

Prolonged exposure to UV light can cause materials to degrade or become brittle. UV-resistant materials protect connectors from damage in environments with frequent UV exposure.

EDAC is committed to providing long-term product solutions to support extended product life cycles. On discontinued or phased out connectors that are critical to your production, EDAC would be pleased to review your requirements and offer a suitable off-shelf or turnkey solution.

Mechanical

Dynamic Movement

Devices requiring movement or flexibility can strain stationary connectors. Flexible connectors with strain relief provide durability in dynamic applications.

Frequent Connections

Frequent connections and disconnections, including accidental ones, can lead to wear or breakage. High-mating-cycle connectors with secure locking mechanisms offer durability and reliability, while quick-disconnect or breakaway solutions are available for applications that require them.

Shock and Impact

Devices used in emergency or mobile applications are subject to drops and impacts. Shock-resistant connectors protect against mechanical damage and maintain functionality.

Space Constraints

Compact medical devices require small connectors without sacrificing performance. Miniaturized connectors ensure efficient use of space while maintaining reliability.

Vibration and Movement

Portable or mobile devices are subject to vibration and movement, which can loosen connections. Vibration-resistant connectors ensure stable performance even in dynamic environments.

Wear and Tear

Repeated use can cause material fatigue and connector failure. Durable connectors with robust designs help withstand wear and ensure long-term reliability.

Weight Constraints

Portable and wearable devices benefit from lightweight components. Lightweight connectors reduce overall device weight without compromising strength or performance.

RELIABLE INTERCONNECT SOLUTIONS FOR CRITICAL MEDICAL APPLICATIONS

Electrical Considerations

For medical applications, connectors must handle high-power loads and protect against electromagnetic interference (EMI) and magnetic fields. **Shielding** is essential to maintain signal integrity in environments with EMI exposure, and **grounding** and **ESD protection** safeguard against static discharge, ensuring safe operation. Connectors **designed for high-current and low-resistance** operation minimize heat generation and energy loss, while **surge protection** helps prevent damage from power spikes, keeping medical devices operational during electrical fluctuations.

Environmental Considerations

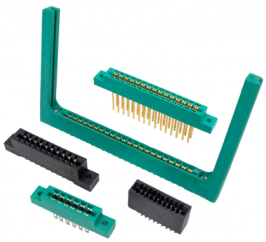
In medical environments, connectors must withstand chemical exposure, biological contamination, and ingress from dust, debris, and fluids. Proper **ingress protection (IP ratings)** ensures connectors remain sealed against these contaminants. **Material selection** plays a key role in ensuring resistance to chemicals, biocompatibility, and UV and radiation exposure, protecting connectors from degradation. For devices used in extreme temperatures or in sterile environments, **hermetic seals and temperature-resistant materials** are essential to maintain performance in challenging conditions.

Mechanical Considerations

Connectors in medical devices are subject to dynamic movement, frequent connections, and vibration, making durability a critical factor. **High-mating-cycle** connectors, combined with **strain relief**, ensure they can withstand repeated connection and movement without failing. **Flexibility and cable management** are necessary for wearable and portable devices that require constant motion, while compact, **space-efficient designs** address space constraints in smaller devices. Additionally, **quick-disconnect and breakaway mechanisms** ensure safe, rapid disconnection in emergencies or high-use situations, protecting the device from damage.

INTERCONNECT SOLUTIONS

Card Edge Connectors



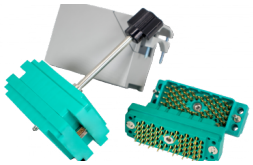
- Card edge connectors available in 446,000+ standard styles, with options for custom variations
- Contact spacing of 0.050”, 0.100”, 0.125”, 0.150”, 0.156” and 0.200”
- Selective gold plating on the contact mating area or gold all over with nickel underplating
- From 2 to 144 contacts in single, bridged, and dual rows with or without card support

Example Applications

Communications, diagnostic, laboratory

Reliable Connection | Standard Designs | Durable Construction
High Density Solutions | High Speed Solutions | Customizable

Rack and Panel Connectors



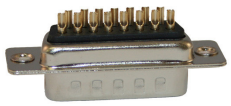
- Industry standard connector with high-reliability contacts
- Hermaphroditic contact design for no-fail and gas tight connections
- Crimp contacts are available pre-installed, separately in bulk, or on a reel for automated process

Example Applications

Communications, diagnostic, laboratory, robotics

Reliable Connection | Durable Construction | EMI/RFI Shielding
Secure Locking | Alignment Features | Customizable

D-Sub Connectors



- In standard, high-density types and DVI formats with waterproof options available
- 9 to 50 pins (Standard), 15 to 78 pins (High-Density), 29 pins (DVI), and 22 standard contact layouts (Mixed Contact or Power Combo)
- Wide variety of footprints in vertical or right-angle orientations with multiple contact terminations
- Metal backshell options available that provide EMI and RFI protection

Example Applications

Cardiovascular, diagnostic, emergency response, patient monitoring

Standard Designs | Durable Construction | EMI/RFI Shielding
High Current Solutions | Waterproof Solutions | Customizable

INTERCONNECT SOLUTIONS

Modular & Magnetic Jack Connectors

- RJ11/RJ45 units are available in single or stacked multi-port configurations, with options for LEDs, shielding, and various mounting styles
- Available in right-angle or vertical orientations with through hole or SMT contact termination styles
- Modular jack connectors with integrated network magnetics save space and provide protection against noise, improving signal integrity

Example Applications

Communications, laboratory, patient monitoring

Standard Designs | Compact Design | Shielded and Unshielded
Multi-Port Solutions | Integrated Magnetics | Customizable

USB Connectors

- Up to 480 Mbps communication speed for standard USB 2.0
- Up to 5 Gbps communication speed for standard USB 3.0
- Up to 10 Gbps communication speed for standard USB 3.1
- Receptacle and plug USB 3.1 Type C available in 6, 16, and 24 pin options
- Synchronous and asynchronous data transfer methods
- Waterproof options are available with quarter-turn twist and lock overmold and o-ring

Example Applications

Cardiovascular, communications, diagnostic, emergency response, infusion systems, mobility, patient monitoring, therapeutic, rehabilitation

Multiple USB Types | Standard Designs | High-Speed Solutions
Compact Design | Waterproof Solutions | Customizable

HDMI Connectors

- Standard 19-pin type A, mini and micro versions are available
- Available in vertical or right-angle orientations and single or dual stacked
- Plating options from gold flash to 30µ" gold for high insertion cycles
- Synchronous and asynchronous data transfer methods
- Waterproof options are available with quarter-turn twist and lock overmold and o-ring

Example Applications

Diagnostic, laboratory

Reliable Connection | Standard Designs | Hi-Def Video and Audio
High Current Solutions | Waterproof Solutions | Customizable

Inline Connectors

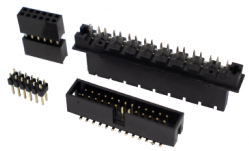
- Non-waterproof inline connectors designed for high-density wire-to-wire and wire-to-board connections
- Contact termination options include PC tail, wire hole, wire wrap, SMT, and crimp
- Waterproof options available with double latch technology for increased retention
- IP52 and IP67 rated options available

Example Applications

Emergency response, infusion systems, mobility, smart beds & surfaces, surgical, therapeutic, rehabilitation, robotics

Reliable Connection | Durable Construction | Compact Design
Ease of Use | Waterproof Solutions | Customizable

Header Connectors



- Header pins can be cut to any height and board depth
- Wide variety of plating options
- Vertical, right-angle, or custom bend orientations
- Breakaway design allows for easy separation into smaller units
- PC tail, SMT, IDC, and press-fit contact terminations available
- DIN 41612 connectors provide durable and reliable connections in modular systems

Example Applications

Communications, diagnostic, infusion systems, laboratory, patient monitoring, robotics, smart beds and surfaces, therapeutic

Reliable Connection | Standard Designs | Durable Construction
Compact Design | Shrouded Solutions | Customizable

Magnetic Pogo Pin Connectors

- To develop truly versatile quick-release connectors, manufacturers need to look beyond conventional pin and socket designs
- The new range of magnetic pogo pin connectors are designed specifically for quick-release applications
- These connectors provide the same quick-disconnect functionality for up to 31 positions
- Premade cable assemblies available with multiple alternate terminating ends including USB, inline, and bare cable

Example Applications

Cardiovascular, emergency response, infection control, infusion systems, mobility, surgical, therapeutic, rehabilitation, robotics

Reliable Connection | Compact Design | Self-Cleaning Contacts
Magnetically Polarized | Quick-Release | Customizable

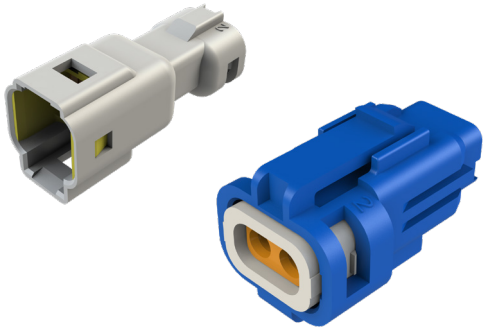
MEDICAL CASE STUDIES

Medical delivery drones will expedite the provision of life-saving supplies to in-field care sites, significantly outpacing conventional delivery methods.

Delivery Drone

Challenge

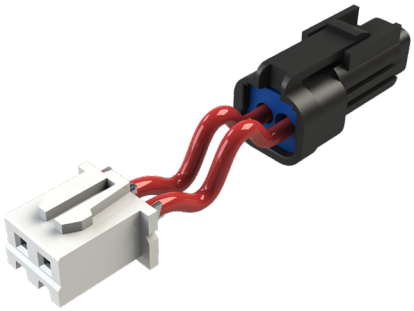
A medical delivery drone, delivering life-saving packages, needed a compact, waterproof connector with strong retention to endure high vibration and extreme weather conditions. In critical moments, reliability and time are everything.



Solution

EDAC's IP67 Waterproof Inline connector series, equipped with double-latch technology for increased retention, addressed both the vibration and shock challenges. Its efficient, compact design fit seamlessly into the drone's constrained space while meeting the power requirements, ensuring reliable performance in harsh environments.

Touchless Dispenser

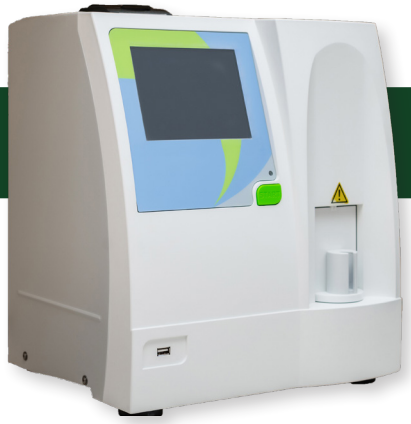


Challenge

With the shift from manual dispensers to sensor-activated solutions, touchless hand sanitizer dispensers have become essential, particularly in healthcare environments. Reducing contact points minimizes contamination risk, ensuring better infection control. This application required a compact solution with a waterproof connection on one side of the cable assembly to protect against liquid exposure.

Solution

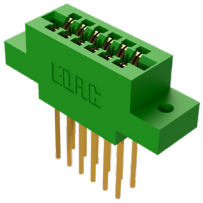
EDAC's Inline connector system, with a non-sealed connector on one side and an IP-rated waterproof connector on the other, provides a reliable and space-efficient solution. It meets all electrical specifications, ensuring consistent and safe operation in critical sanitation environments.

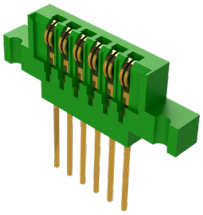


Blood Analyzer

Challenge

A blood analyzer required a single readout card edge connector with exceptionally precise and consistent spring force, maintaining a minimal deviation tolerance. Instead of inserting the board into the connector, the design involved pressing the board against the contact mating area, demanding high precision in the connector's performance.



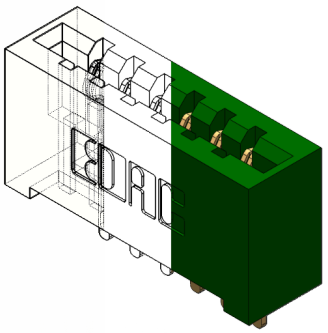


Solution

EDAC's half insulator card edge solution offers an extremely precise contact design, ensuring the consistent spring force necessary to meet the application's demanding requirements. This customized solution was tailored to provide optimal performance, addressing the specific needs of the application.

Designing custom interconnect solutions minimizes risk to your project and increases success, especially in industries with regulatory compliance requirements.

Custom solutions from concept to production in as little as 12 weeks



Why EDAC?

EDAC is a global leader in connector manufacturing, recognized for its innovative solutions and expertise since 1966. With a head office and design engineering center in Canada, EDAC offers a comprehensive range of interconnect products. We specialize in delivering tailored solutions to global customers, serving OEMs, ODMs, CMs, and distributors through an extensive network of fulfillment centers and highly skilled engineering and quality assurance teams. EDAC's commitment to total quality and seamless delivery ensures that our products meet the highest standards while consistently exceeding customer expectations.

At EDAC, our strength lies in collaboration and adaptability. We can offer custom solutions and value-added solutions, like wire harnesses and cable assemblies, with the flexibility to produce low and high-volume orders to customer specifications. With a robust, global team of engineers and program managers, we provide cost-effective, on-time solutions from prototype to production. Our dedication to integrity, innovation, and quality drives long-term partnerships and supports customer success in fast-evolving industries.

Certifications

ISO 9001:2015 · ISO 14001:2015 · IATF 16949:2016 · RoHS

ECIA MEMBER
Supporting The Authorized Channel

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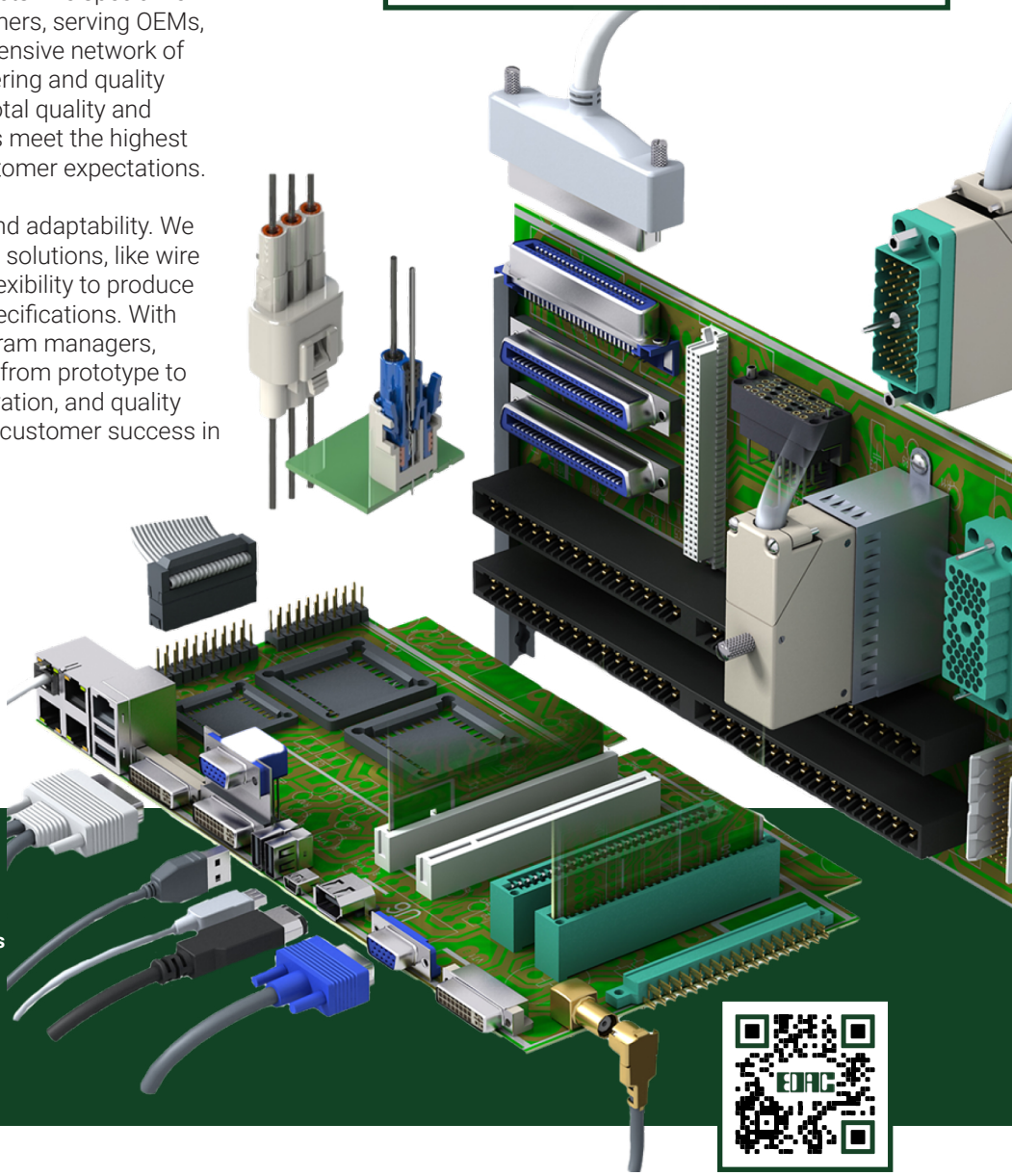


Our Capabilities

- Manufacturing Excellence
- Exceptional Service
- Global Shipping
- Engineering Expertise
- Innovative Solutions
- Customized Designs
- Rapid Prototyping
- Quality Assurance
- Competitive Pricing

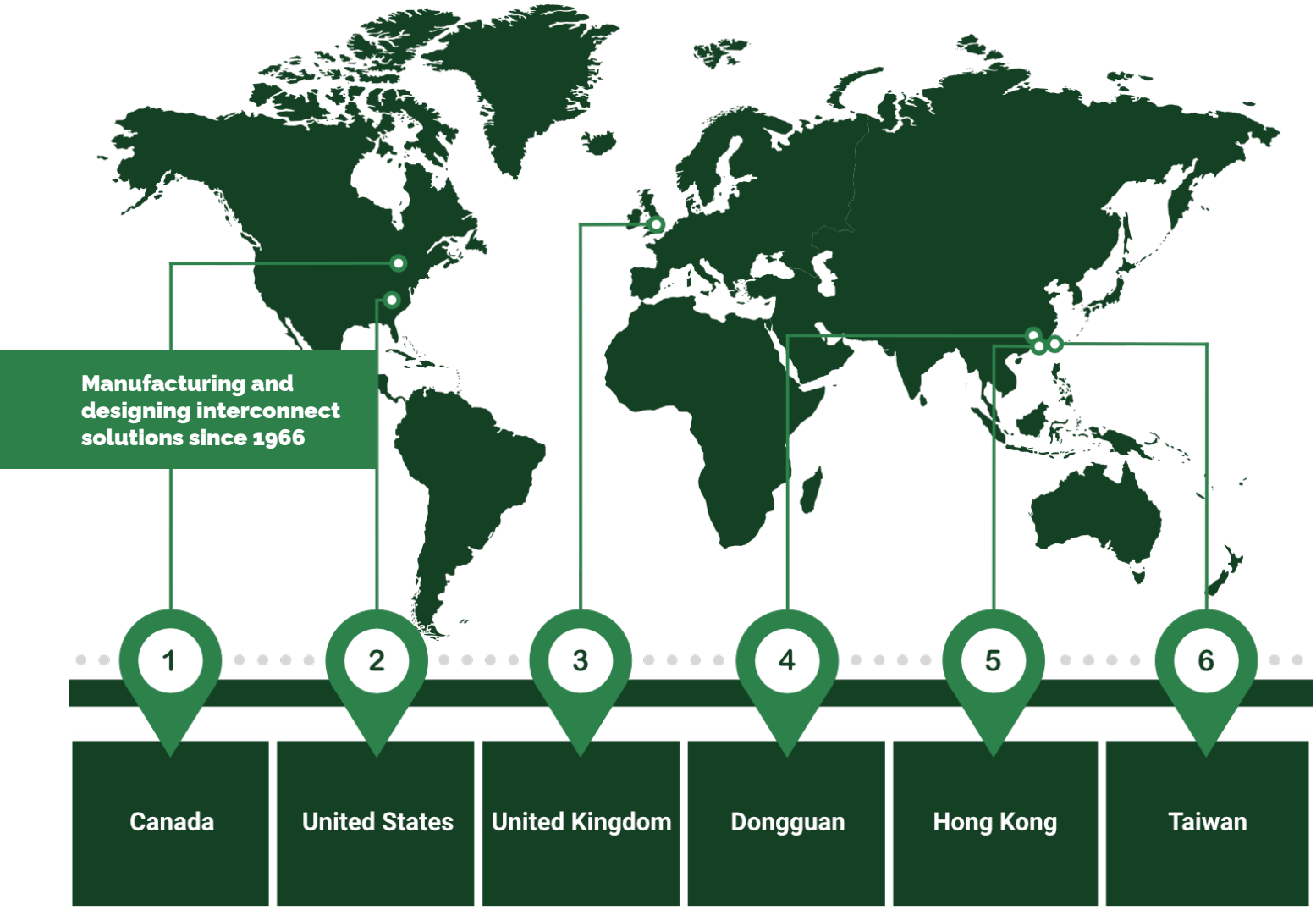
Product Catalog

EDAC's global presence and manufacturing excellence deliver cost-effective interconnect solutions, designed with the customer in mind, enabling seamless project execution and ensuring success through dedicated engineering teams and worldwide support.

EDAC GROUP OF COMPANIES
EDAC
58+ YEARS
EST. 1966
INTERCONNECT SOLUTIONS

Markets Served

- Consumer
- Medical
- Ruggedized
- Agriculture
- Energy
- Process Control
- Transportation
- Communications
- Industrial
- Robotics



[1] Vudathaneni VKP, Lanke RB, Mudaliyar MC, Movva KV, Mounika Kalluri L, Boyapati R. The Impact of Telemedicine and Remote Patient Monitoring on Healthcare Delivery: A Comprehensive Evaluation. Cureus. 2024 Mar 4;16(3):e55534. doi: 10.7759/cureus.55534. PMID: 38576693; PMCID: PMC10993086.

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