C/A DESIGN

PROTECTING THE WARFIGHTER

C/A DESIGN
STANDARD PRODUCT CATALOG

2025

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About C/A Design

Since 1993

C/A Design has been a trusted provider of high-quality brazed compact heat exchangers, cold plates, CNC machined parts, electronic enclosures, and engineering solutions to the Aerospace & Defense Industtry. Over the years, we have built a reputation as pioneers in the brazing industry, with our clients relying on our expertise to deliver intricate and complex components.

In 2025, to enhance its service to customers in the Aerospace & Defense sector, C/A Designs' sister company, Wakefield Thermal Rugged & Defense, has merged into a single unified entity. This new division introduces an expanded range of both standard Commercial Off-The-Shelf (COTS) products and custom solutions for the Aerospace & Defense industry, including Wegelock Card Retainers, Heat Frames, Ejectors & Injectors, and Liquid Cold Plates.

Our proficiency in custom cooling and embedded applications is harnessed to deliver products tailor-made to fit your specific needs. The one-stop-shop nature of our services, encompassing in-house engineering, brazing, and heat treatment, makes it possible for us to cater to your most demanding projects seamlessly.

C/A Timeline

Simon INDUSTRIES

Wakefield Thermal Solutions acquires Simon Industries Inc., a leader in technical thermal products for the military and aerospace industries located in Research Triangle, North Carolina

WAKEFIELD THERMAL RUGGED & DEFENSE

After Simon Industries was acquired by Wakefield Thermal it was rebranded under Wakefield Thermal's Rugged & Defense division.

C/A DESIGN

C/A Design Inc., established in 1993, specializes in providing quality engineering services, compact heat exchangers and electronics enclosures, primarily catering to aerospace customers.

PART OF THE HEICO COMPANIES

In October 2016, The Heico Companies acquired Costello/April Design Incorporated (C/A Design)

TSS

Following the acquisition, C/A Design became part of Heico's Thermal Solutions Segment (TSS), which includes other companies such as Wakefield Thermal and Vette Corp

In 2023, construction progressed on a new 115,000 square foot facility for C/A Design in Exeter, New Hampshire, further enhancing its manufacturing capabilities.

Exeter NH

- Vacuum Brazed Rugged Enclosures
- Dip Brazed Rugged Enclosures
- Liquid Cold Plates

- 37 CNC Machines
- 6 Furnaces
- Assembly
- 3, 4, and 5 Axis Machines
- Dip Braze tank
- 2 Vacuum Braze Oven
- Chromate line
- Wire EDM
- Live Tooling Lathes

- AS9100
- ISO 9001:2015
- ITAR Registered
- CMMC
- NIST

- 117,000 Sq. Feet
- 100 Employees

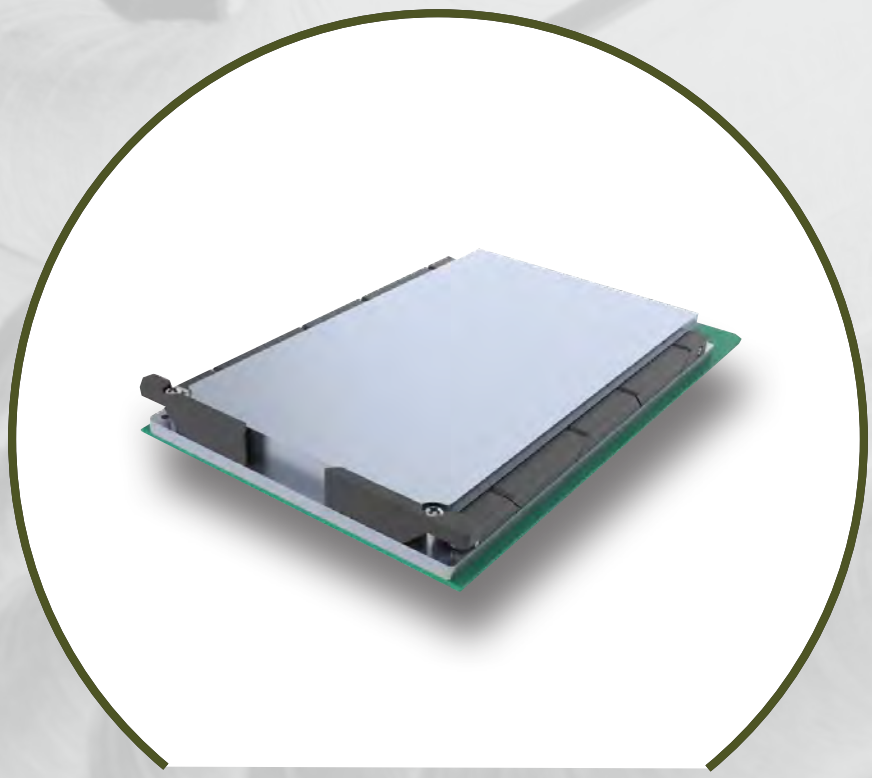
Raleigh NC

- Rugged & Defense Heat Frames
- Wedgelocks
- Liquid Cold Plates
- Rugged Enclosures
- Complex Machining
- Front Panels & Ejectors

- 30 CNC Machines
- 3, 4, and 5 Axis Machines
- Complete Silkscreen
- Laser Etching
- Saws
- Assembly
- Tumbling

- AS9100
- ISO 9001:2015
- ITAR Registered
- CMMC
- NIST

- 50,000 Sq. Feet
- 100 Employees



Heat Frames

Embedded Cooling

Heat frames are CNC precision-machined out of solid aluminum (or copper) and precisely match the topography or skyline of an electronic printed circuit board being ruggedized. When combined with thermal-interface material or “gap pads,” conduction-cooled heat frames increase a board’s operating temperature range, as well as its resistance to shock and vibration. When integrated with wedgelocks and ejectors, this product allows VME, cPCI and other boards to fit within conduction cooled chassis slot dimensions with zero insertion force. Heat frames can be designed for compliance with industry specifications and can also accommodate mezzanine cards as needed.

Embedded Cooling

Heat Frames

VPX Series

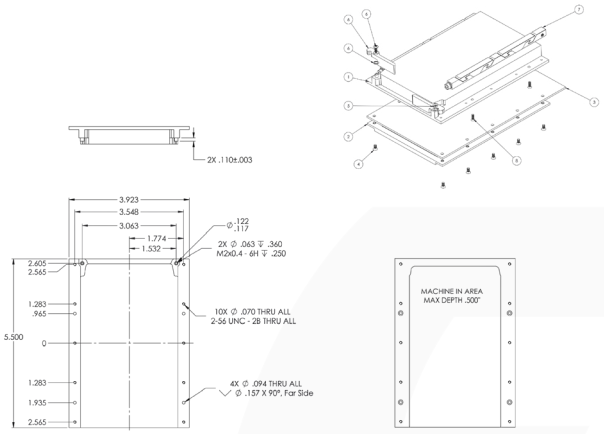
Conduction Cooled

Click for Data Sheet

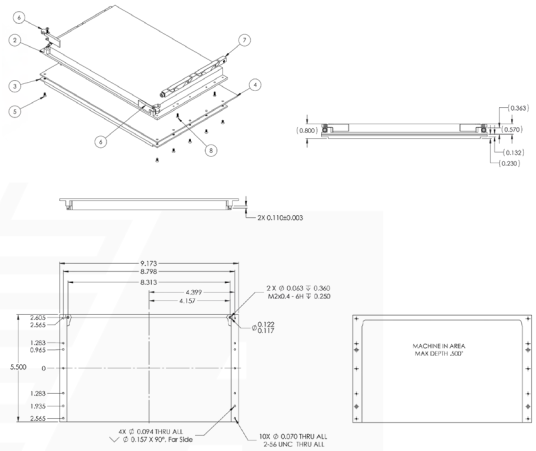
C/A Design VPX Heat Frame Assembly Kit. When integrated with wedgelocks and ejectors, this product allows VPX boards to fit within conduction cooled chassis slot dimensions with zero insertion force. Heat frames can be designed for compliance with many industry standards.

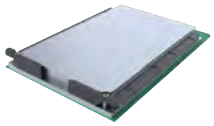
SKU	Series	Form Factor	Material	Finish
VPX-482085-3U	VPX	3U	Aluminum 6061-T6	Black Anodize
VPX-482085-6U	VPX	6U	Aluminum 6061-T6	Black Anodize

VPX-482085-3U



VPX-482085-6U





VME Series

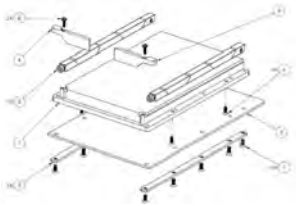
Conduction Cooled

Click for Data Sheet

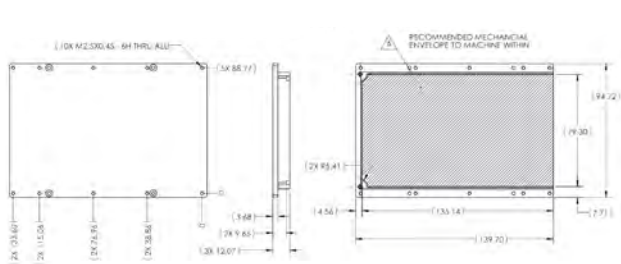
When integrated with wedgelocks and ejectors, this product allows VME, cPCI and other boards to fit within conduction cooled chassis slot dimensions with zero insertion force. Heat frames can be designed for compliance with many industry standards.

SKU	Series	Form Factor
VME-HF-3U	VME	3U
VME-HF-6U	VME	6U

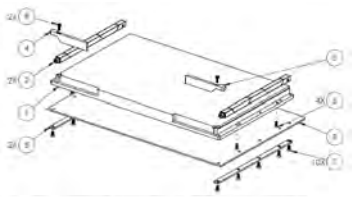
VME-HF-3U



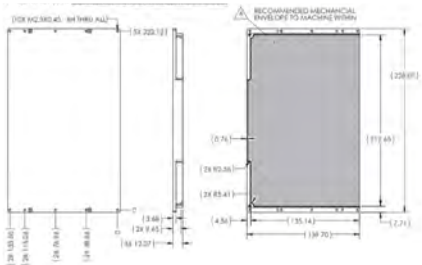
128791 VME HEAT FRAME 3U BLANK



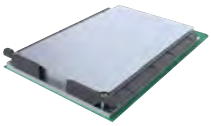
VME-HF-6U



128793 VME HEAT FRAME 6U BLANK



Heat Frames



CPCI Series

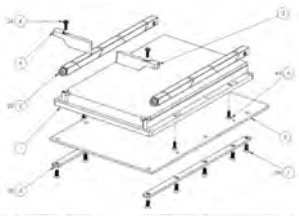
Conduction Cooled

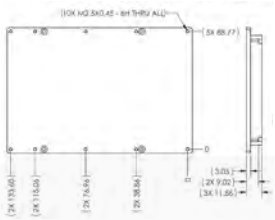
Click for Data Sheet

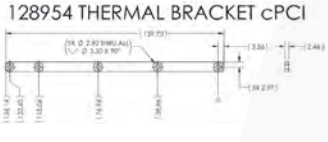
C/A Design 3U CPCI Heat Frame Blank Assembly Kit. Keep these mission critical components cooled by exploring use of the 3U CPCI Heat Frame Blank Assembly Kit from C/A Design. Each Heat Frame Kit includes Frame, 2 Wedgelocks, 2 Ejectors, Thermal Bracket, and Hardware to test your application.

SKU	Series	Form Factor
CPCI-HF-3U	**CPCI**	**3U**
CPCI-HF-6U	**CPCI**	**6U**

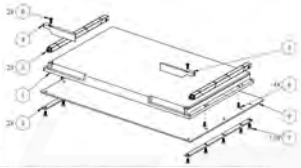
CPCI-HF-3U

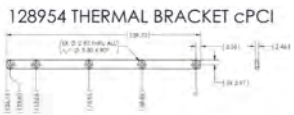


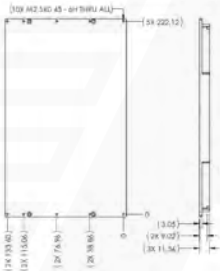




CPCI-HF-6U







Liquid Cooled

State-of-the-Art Liquid Cooling Systems

Our state-of-the-art liquid cooling systems are engineered to meet the rigorous demands of high-performance and ruggedized applications, ensuring your electronic components maintain peak performance even in the most challenging environments.

How Liquid Cooling Works

Our liquid cooling systems operate with precision and reliability:

- **Liquid Coolant Circulation:** A specialized cooling fluid (like PAO, JP8, EGW) circulates through meticulously designed channels within the heat frame.
- **Heat Absorption and Transfer:** Heat from electronic components is absorbed by the liquid coolant, which acts as an efficient heat transfer medium.
- **Dissipation:** The heated liquid is directed towards a radiator or heat exchanger, where the heat is efficiently dissipated into the surrounding environment.
- **Continuous Performance:** This cycle ensures electronic components remain cool, stable, and ready to perform at their best.

Designed for Critical Applications

Our liquid cooling solutions are ideal for:

- **High-Power Electronics:** Keep systems cool and operational under heavy loads.
- **Military and Aerospace Systems:** Ensure reliability in mission-critical situations.
- **Harsh Environments:** Perfect for applications where maintaining a stable temperature is essential.

Heat Frames

Air Cooled

Efficient Thermal Management with Air Cooling

In the demanding environments of aerospace and defense, maintaining the right temperature for electronic components is crucial. Our air cooling solutions offer a practical and effective means to dissipate heat, ensuring your systems remain operational and efficient.

How Air Cooling Works

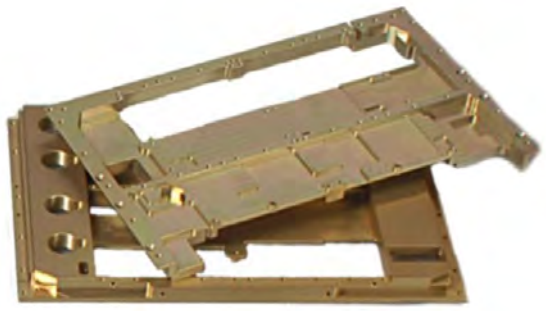
Our air cooling systems are expertly engineered for efficiency and ease of use:

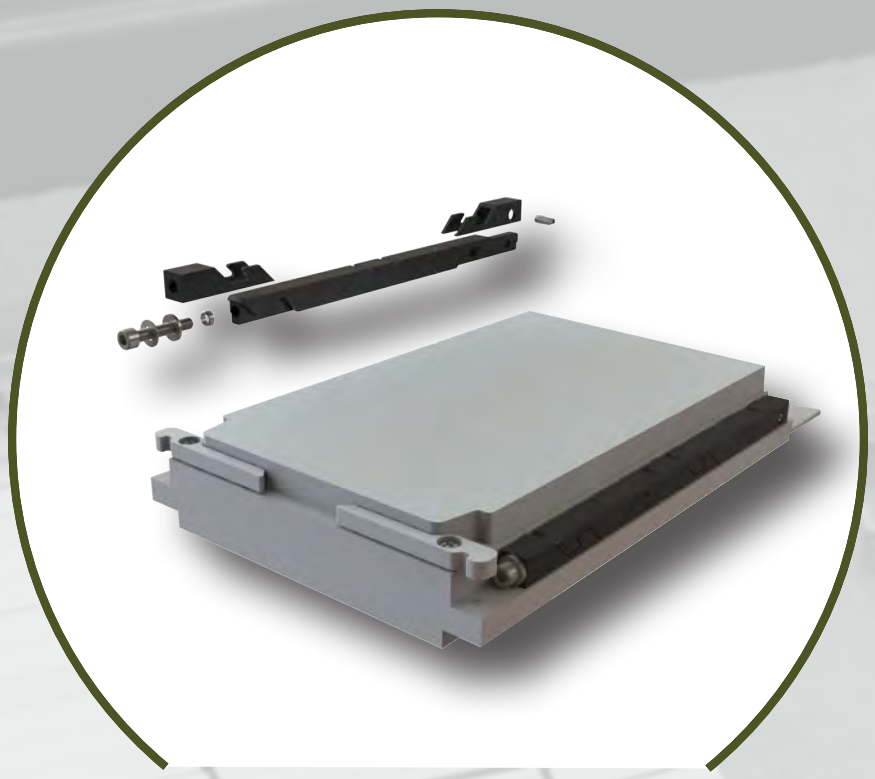
- **Heat Transfer to Heat Frame:** Heat generated by electronic components is efficiently transferred to the heat frame.
- **Increased Surface Area:** The heat frame is designed with fins or other structures to maximize surface area.
- **Airflow for Heat Dissipation:** Air, moved naturally or with fans, flows over the fins, carrying heat away from the components and dissipating it into the surrounding environment.
- **Consistent Performance:** This simple yet effective process ensures your components stay cool and perform at their best.

Ideal for Various Applications

Our air cooling solutions excel in scenarios where:

- **Simplicity is Key:** Benefit from straightforward installation and operation.
- **Cost-Effectiveness Matters:** Achieve thermal management without the high costs associated with complex systems.
- **Ease of Maintenance is Essential:** Enjoy reduced maintenance needs compared to more intricate cooling systems.





Wedgelocks

Embedded Cooling

C/A Design provides COTS and Custom Wedgelocks for your embedded cooling applications. Wedgelock card retainers offer high locking force for cold wall applications. In a typical application they will mount either directly to the PCB or to a heat frame assembly with screws or rivets and are then inserted into a machined channel of a cold wall within a rugged enclosure. When expanded, the wedgelock will clamp the PCB in place providing resistance to shock and vibration as well as a thermal path for heat transfer between the PCB and the cold wall.

Embedded Cooling

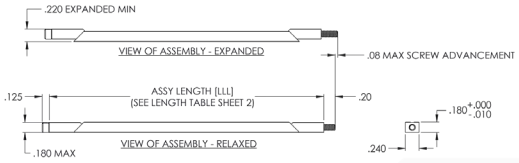
Wedgelocks

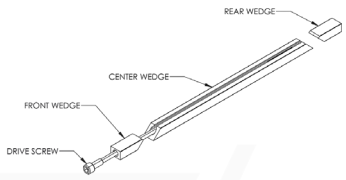
‘B’ Style Wedgelocks

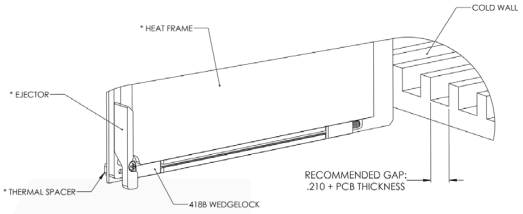
COTS

3-Wedge Configuration with Long Screw. Mounting Location: Center Wedge. Lengths from 1.80″+. Various finishes available. Custom configurations available

‘B’ Style		Assembly with Long Screw			DSCC CID
Series	Wedges	Height	Width	Length (Min)	
418B	3	0.180	0.240	1.80+	59590/11/12
422B	3	0.220	0.220	1.80+	59590/7/8/9/10
426B	3	0.260	0.225	1.80+	59590/3/4/5/6





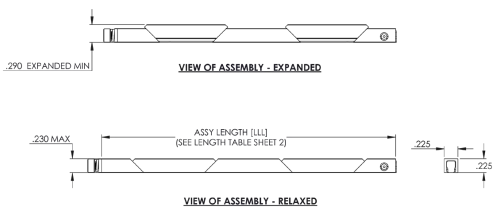


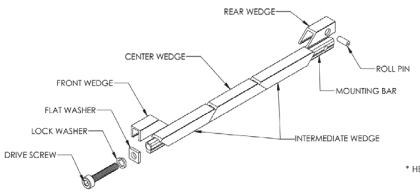
‘C’ Style Wedgelocks

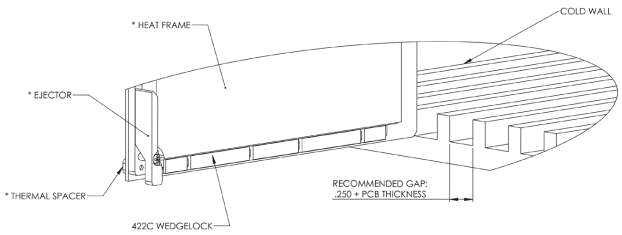
COTS

3, 5, or 7-Wedge Configuration with Mounting Bar. Mounting Location: Mounting Bar. Lengths from 1.80″+. Various finishes available. Custom configurations available.

‘C’ Style		Assembly with Mounting Bar			DSCC CID
Series	Wedges	Height	Width	Length (Min)	
422C3	3	0.225	0.225	1.80+	
422C	5	0.225	0.225	2.80+	59789/9/10
422C7	7	0.225	0.225	4.80+	59950/1/2
426C3	3	0.260	0.250	1.80+	
426C	5	0.260	0.250	2.80+	59789/19/20
426C7	7	0.260	0.250	4.80+	59950/3/4
438C3	3	0.375	0.365	2.80+	
438C	5	0.375	0.365	3.80+	59789/15
438C7	7	0.375	0.365	4.80+	
426W	5	0.260	0.365	2.80+	







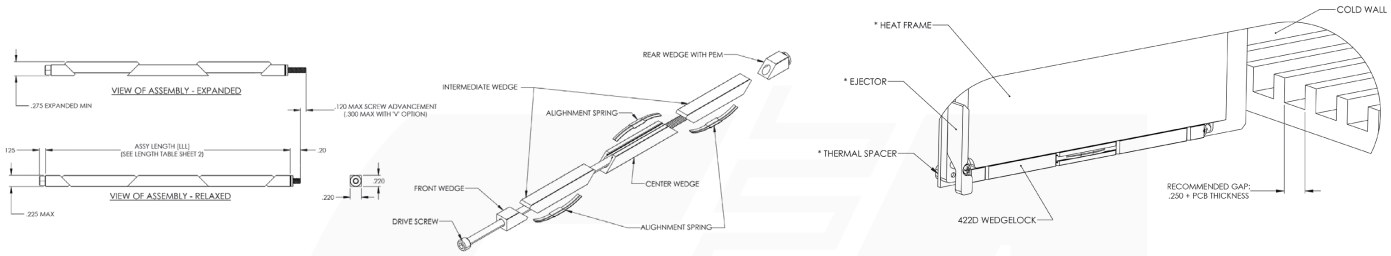
Wedgelocks

‘D’ Style Wedgelocks

COTS

5-Wedge Configuration with Long Screw. Mounting Location: Center Wedge. Lengths from 4.80″+. Various finishes available. Custom configurations available.

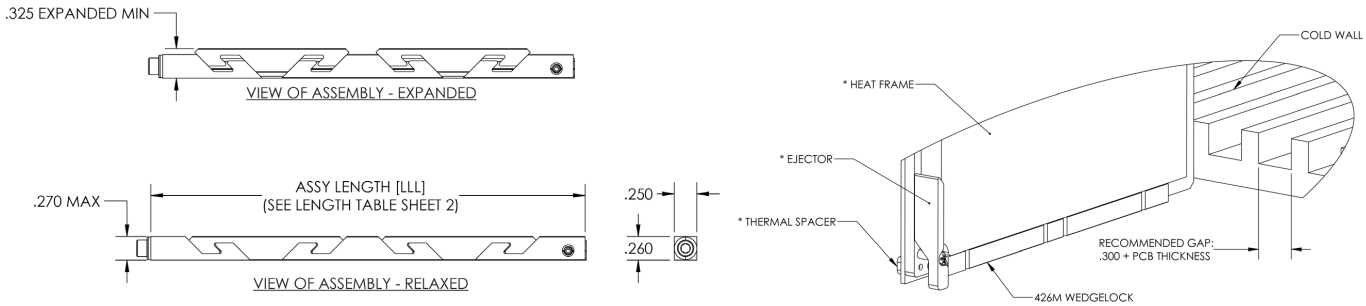
‘D’ Style		Assembly with Mounting Bar			DSCC CID
Series	Wedges	Height	Width	Length (Min)	
422D	5	0.220	0.220	4.80+	59798/3/4
426D	5	0.260	0.225	4.80+	59789/1/2

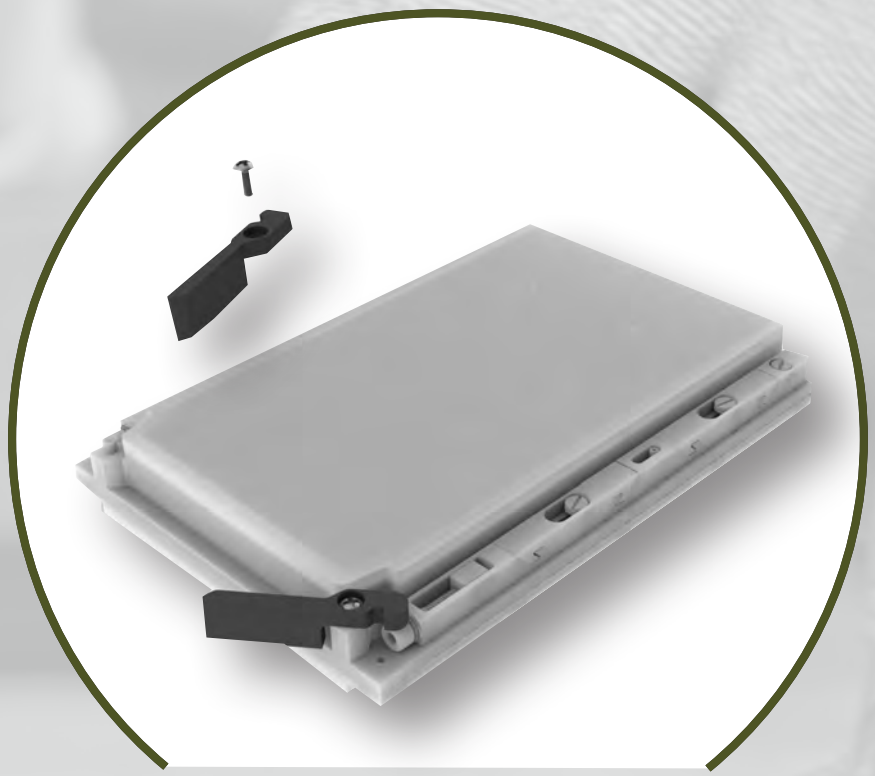


‘M’ Style Wedgelocks

COTS

Designed for heavy shock and vibration. Uniform clamping force and high thermal transfer. Captivated rear wedge. Patented wedge design guarantees wedge retraction for consistent card removal. Special lengths, finish, and other design options available upon request.





Ejectors & Injectors

Embedded Cooling

Ejectors/Injectors are used in application where customers need to install or remove heat frames from ruggedized chassis. The designs are complaint to specifications from IEEE and Vita and work with conduction, convection and liquid cooled frames. Typically made of lightweight aluminum, but can be made from stainless steel for high strength applications.

Embedded Cooling

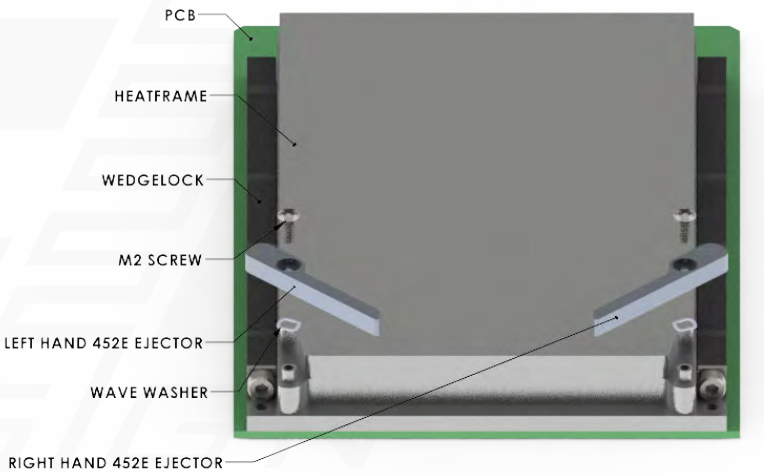
Ejectors & Injectors

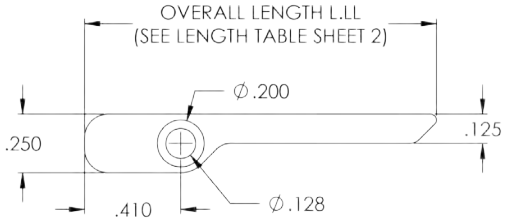
452E Series

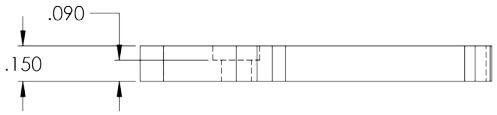
Click for Data Sheet

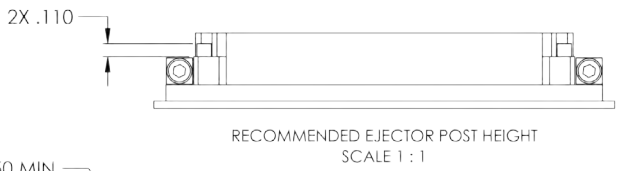
The 452E ejectors are a ready to go insertion and extraction solution for embedded computing heat frames. The 452E can adapt to 3U or 6U frames through material and length options. The slim design allows for maximum PCB component space. Designed for VITA 48 applications this ejector is ready to be inserted into any design.

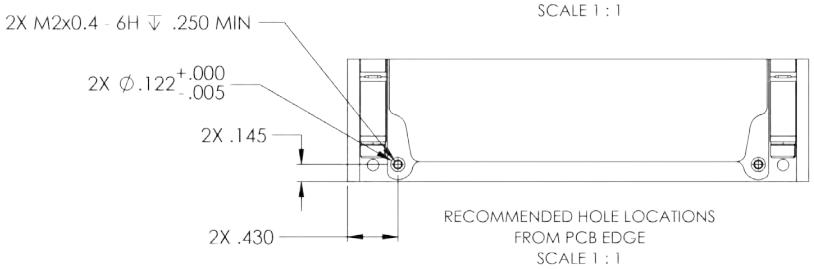
Length and Material Table						
[LLL]	L.LL (IN.) Overall Length	[M] Material Code	Material	Recomended For	Machanical Advantage	Max Injection / Ejection Output Force
150	1.50	U	6061-T6 Aluminum	3U-Boards	2.7x	60 lbs
150	1.50	V	7075-T6 Aluminum			110 lbs
200	2.00	U	6061-T6 Aluminum	6U-Boards	3.9x	34 lbs
200	2.00	V	7075-T6 Aluminum			62 lbs









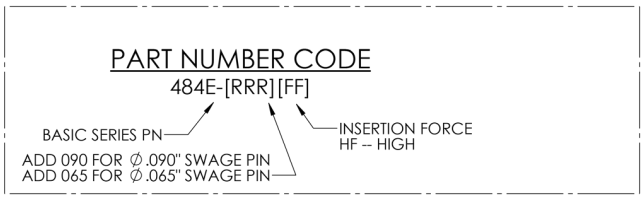


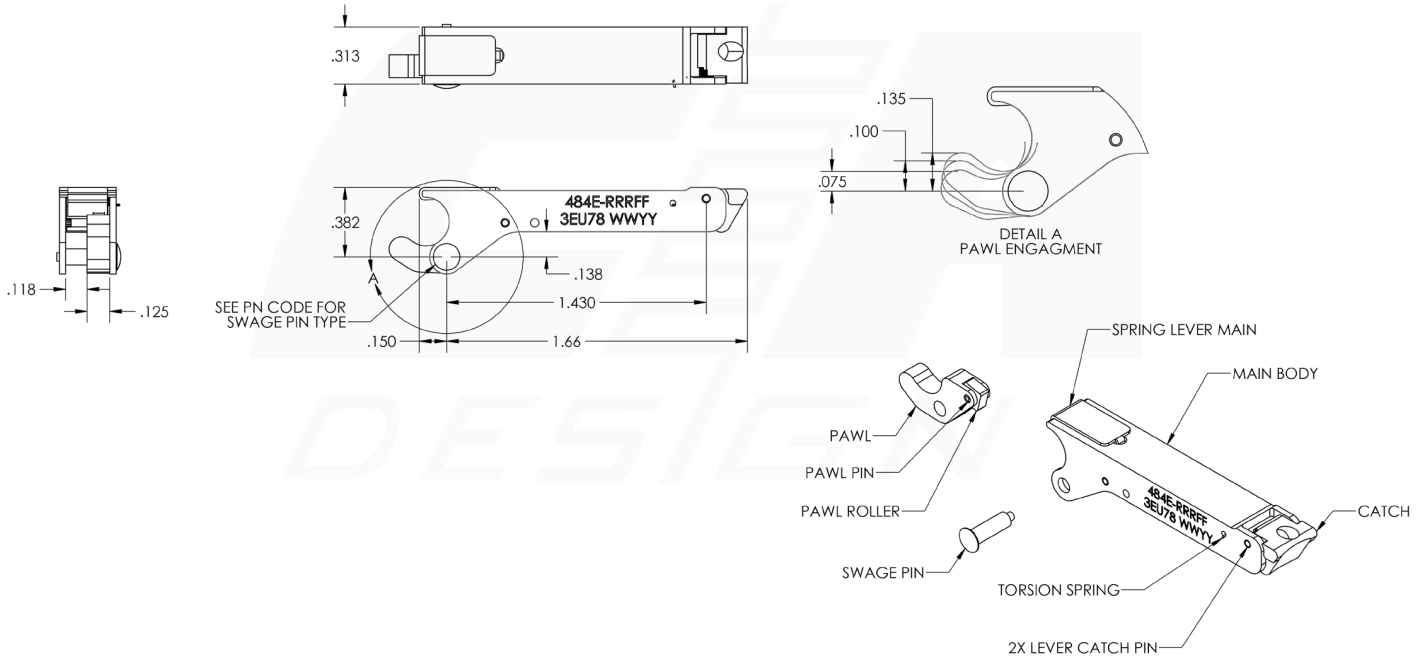
Ejectors & Injectors

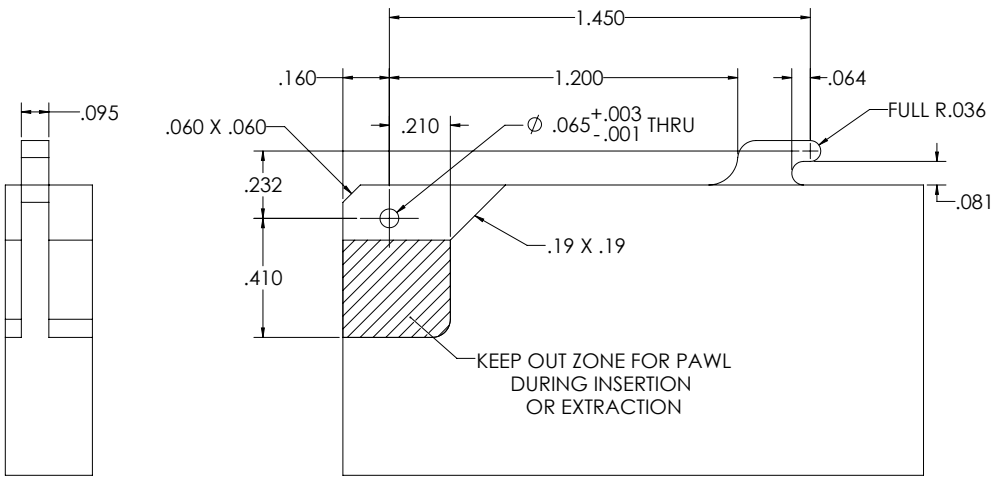
484E Series

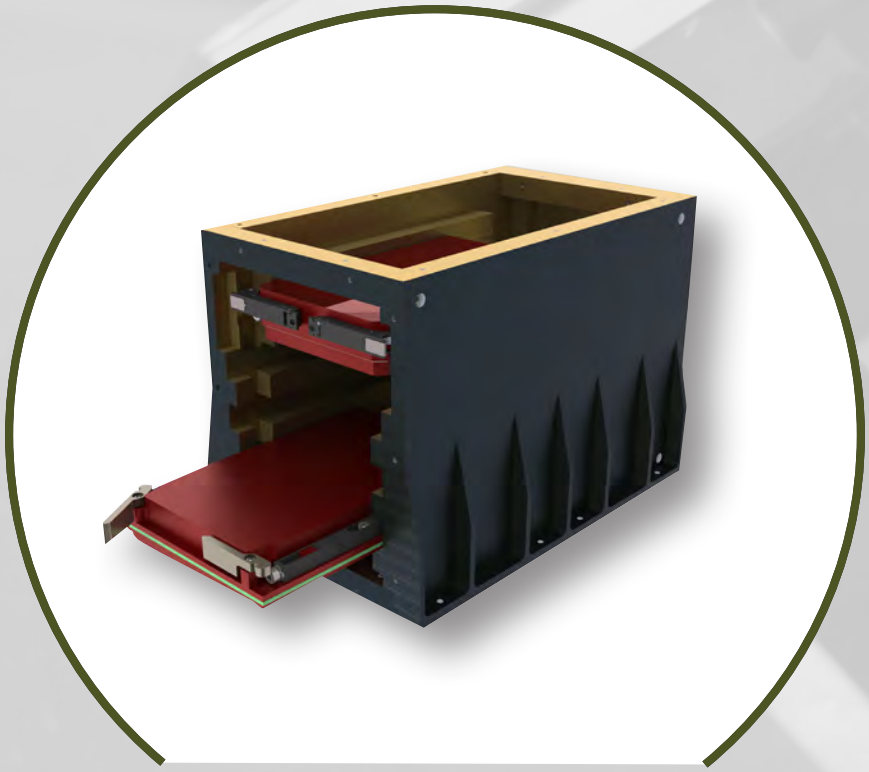
Click for Data Sheet

The smart lever is the best choice for confidently securing heat frames within dynamic environments. After frame engagement within a chassis, the smart lever applies continuous pressure on electrical or fluid connections. This lever allows for critical tolerance compensation within rugged environments.









Rugged Enclosure

Embedded Cooling

The rugged enclosures design and manufacturered by C/A Design can help with the thermal management for internal devices. The enclosures are optimized for structural and thermal performance to ensure that critical electronics are not overheating and restricting performance.

Embedded Cooling

Rugged Enclosures

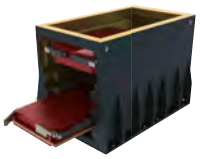
Rugged Enclosures Variations

As we look to complete the infrastructure associated with Mil/Embedded computing we come to the most challenging component (top of the pyramid) which is the Rugged Enclosures. It is the responsibility of the rugged enclosures to protect the heat frames both structurally and thermally by transferring their heat to the external ambient. The Rugged Enclosures can range in structural requirements from very basic to very complex where they are designed to meet:

- MIL-STD-810 – Shock/vibration, Environmental
- MIL-STD-901D -- Shock/vibration
- MIL-STD-461 – EMC
- ARINC 404 and 600 – standard ATR sizes

There are multiple methods of construction associated with the Rugged Enclosures depending on the mechanical and structural requirements. Any of the construction method could be used to design and build a Rugged Enclosures to support:

- Vita 48
  - 48.2 – Conduction Module
  - 48.4 – Liquid Flow-Thru Module
  - 48.5 – Air Flow-Thru Module
  - 48.7 – Air Flow-By™ Module
  - 48.8 – Air Flow-Thru Module
- VME
- cPCI
- Vita 65 – OpenVPX
- Vita 90.4
- ATCA

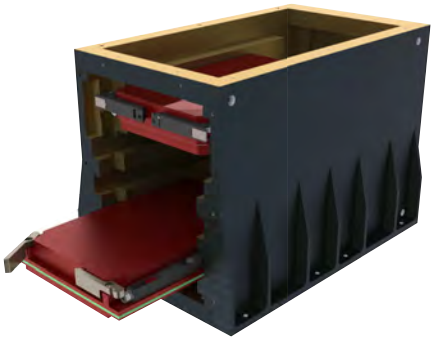


Bolted & Bonded

Rugged Enclosures

The most basic rugged enclosures construction is called bolted and bonded. It uses a combination of adhesive and screws to join the basic pieces of the Rugged Enclosures together in order to provide structural integrity. These Rugged Enclosures consist of a minimum of four walls, any typically the side walls are designed to interface with the heat frames wedge locks and ejectors and serve as the primary method for extracting the heat from the heat frames and into the Rugged Enclosures. Depending upon the thermal requirements the sidewalls, and top wall may be covered with fins to help dissipate the heat in a natural or force convection environment. While the bolted and bonded Rugged Enclosures may provide a lower level of thermal and mechanical protection, it also has the advantage of being the least cost and fastest to production versus other manufacturing methods.

SKU	Material
CCC-3S-3U	Aluminum



Rugged Enclosures

Brazed

Rugged Enclosures

The next level up in rugged enclosures design would be a brazed construction. A brazed Rugged Enclosures could be either dip or vacuum braze based on the requirements. In general, a dip brazed Rugged Enclosures is easier and less complex than a vacuum brace and dip brazed is best suited for open channel geometry. The open channel geometry allows the molten salt to easily flow out of the Rugged Enclosures without becoming trapped. An example of an open channel geometry would be folded fin brazed to a cold wall to provide extended surface area for a force convection cold Rugged Enclosures. In a dip braze Rugged Enclosures typically the four walls and any extended surface area are put through the dip process to provide both good structural rigidity as well as improve thermal transfer.

Combination Construction

Rugged Enclosures

You cannot use both dip and vacuum brazing on the same part, but you can use them on separate components and then join those pieces together. Combining methods allows for a cost-effective yet flexible design that meets requirements. For example, a chassis with liquid cooling can have vacuum-brazed liquid channels and dip-brazed air-cooled sections, which are then bolted and bonded together. Size limitations might also require mixing methodologies; large chassis with liquid passages through multiple walls may be more practical to vacuum braze in parts and assemble using o-rings for leak-free joints.

Front Panels & Accesories

Embedded Cooling

C/A Design manufactures both standard and custom front panels that are fully assembled and ready to mount to your PCB. Parts are made from extrusion and manufactured on high-speed CNC machines to mill your custom details, providing a superior finish and precision fit to your board. Each item can then be completed with plating and silkscreen before final assembly and kit with mounting hardware.

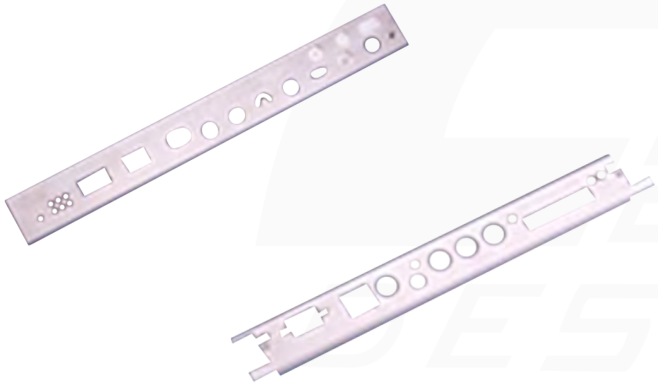
Embedded Cooling

Front Panels & Accesories

Offerings

Front Panels & Accesories

C/A Design manufactures both standard and custom front panels based on IEEE, VME and compact PCI standards that can be fully assembled and ready to mount to your PCB. Parts are made from standard materials (aluminum extrusion or plate) and manufactured on high-speed CNC machines to your custom designs. For higher volume applications, we can stamp the material to meet the design requirements. Each panel can then be completed with plating, silkscreen and or kitted with the hardware for ease of assembly in your facility.



Front Panels & Accesories

Finishes

Front Panels

C/A Design also provides a variety of standard finishes for your products which include clear chromate, clear and black anodize, and powder coat along with our in-house silk-screening service.

Applications

- PMC
- XMC
- FMC
- VME Flat Panel
- 1101.10 compliant
- Electrical/Electronic instrumentation, controls, and devices
- Electronic communication equipment
- Computer system front and rear back panels
- 19-inch panel plates - 1U, 2U and 3U make for many different applications
- Audio devices, vacuum tube amplifiers, and signal processing equipment

Features & Options

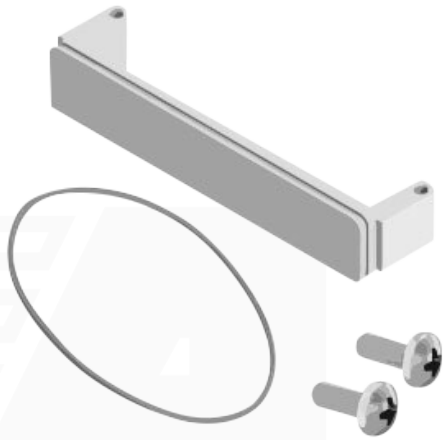
Front Panels

- Panel cutouts
- Multi-color silk-screened
- Choice of EMC gaskets
- Choice of surface finish
- Optional hot swap microswitch installation
- Assembly and kitting

Bezel Kits

Accesories

FMC & PMC Mezzanine Cards describes a specification of I/O mezzanine modules in conjunction with FPGA or another device with configurable I/O capability. The design allows use on any industry standard slot card with form factors such as VME, VPX, CompactPCI, AdvancedTCA, MicroTCA, PCI, PXI, and many others. Made from aluminum, the kit includes a bezel, elastomer gasket, and two M2 x 6mm stainless steel screws. C/A Design can customize your specific application needs for custom FMC & PMC Bezels, including custom cutouts, silkscreen/Pad Printing, or full-coverage paint.

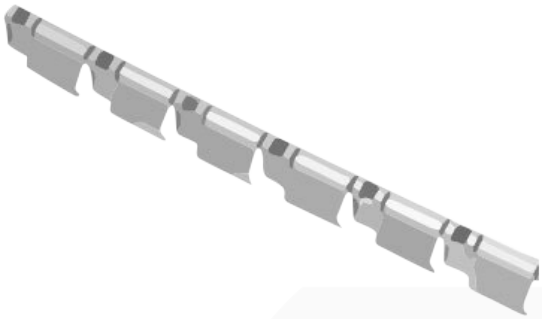


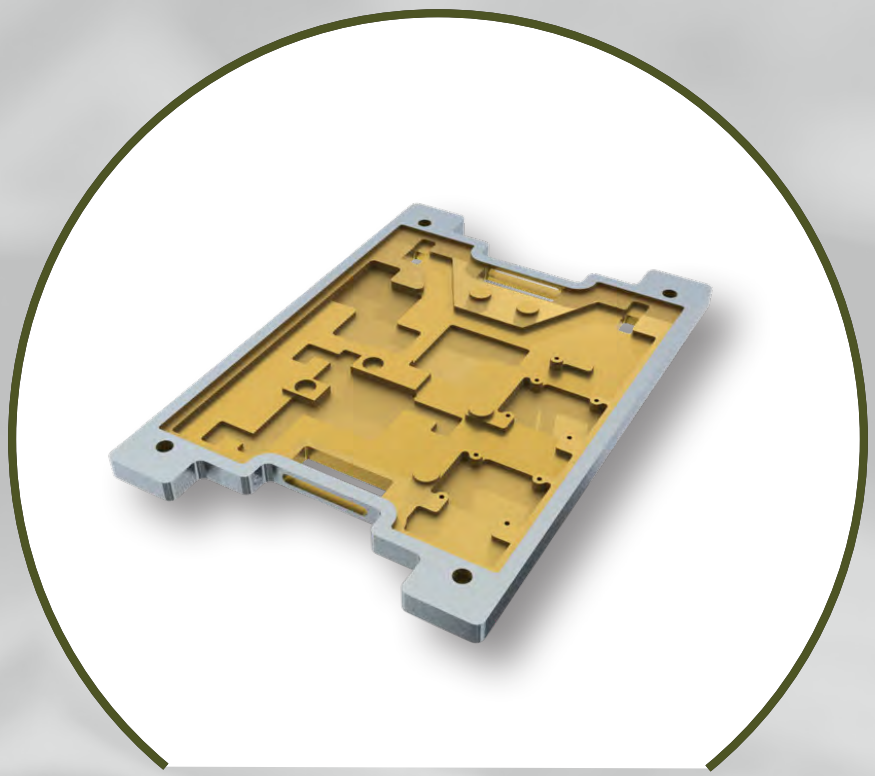
Front Panels & Accesories

Gaskets

Accesories

The gaskets from C/A Design are designed for EMC shielding between the horizontal rails and covers. They are made from stainless steel for better resistance against corrosion. The vertical gaskets are to ensure EMC protection between the subrack side panel and the front/rear panels. There are two versions available. They are suitable for mounting on: 482.6mm (19") flanges for subracks; rear corner trims; EMC contact strip; U-channel front panels; trim panels for Ripac Vario-Module; and flanges for Ripac Vario-Module. The horizontal gasket is for horizontal EMC protection for snapfastening onto the front horizontal rails.





RF Machined Housing

Embedded Cooling

RF (Radio Frequency) machined housings are typically made using precision machining processes to ensure they meet the specific requirements for shielding, durability, and performance in high-frequency applications.

Embedded Cooling

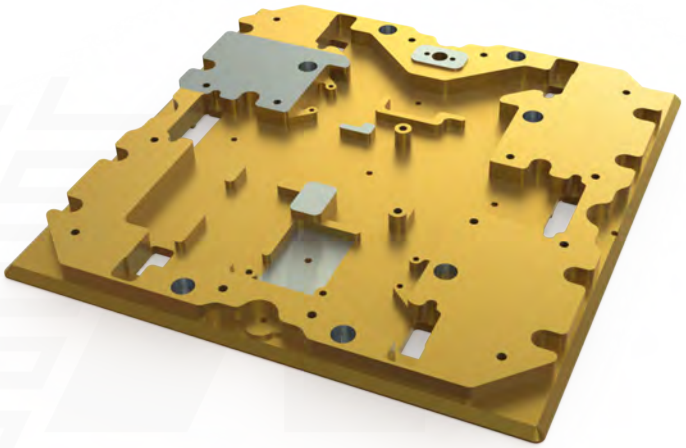
RF Machined Housing

Overview & Process

RF housings are commonly made from metals with good electrical conductivity and shielding properties, such as aluminum, copper, brass, or stainless steel. The material is chosen based on its ability to provide effective electromagnetic interference (EMI) shielding, which is essential for RF applications.

A detailed computer-aided design (CAD) model is created to define the exact dimensions and features of the housing. This design includes necessary RF-specific features like grounding points, shielded cavities, and ports for connectors or cables. The design must account for the RF performance, including maintaining a uniform and low-resistance conductive surface.

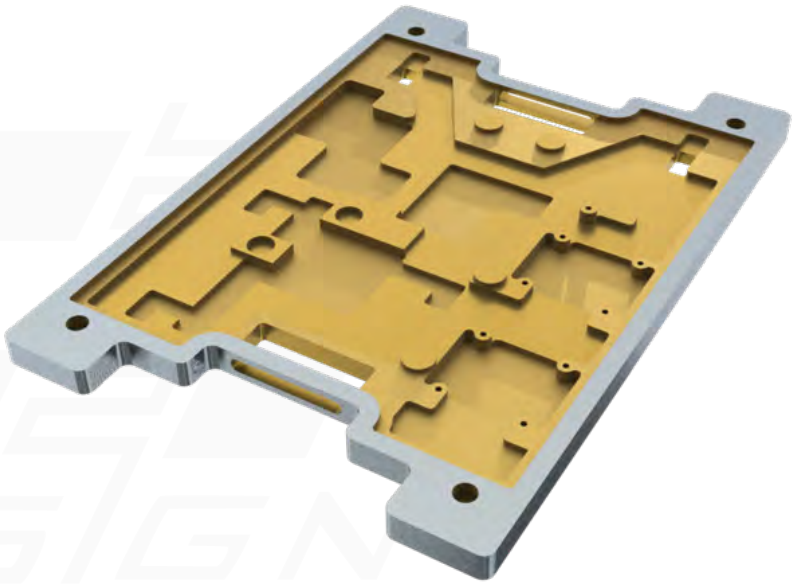
After the model is created it is time now to manufacturing the RF Machined housing utilizing CNC machines to mill and turn the material into the desired housing shape. This step is crucial for achieving tight tolerances and intricate features. Holes for connectors, fasteners, and other components are drilled with precision to ensure proper fitting. Finally, the machined surface is often smoothed to eliminate rough edges that could interfere with RF shielding. Depending on the material, techniques like electro-polishing (for metals) may be used to achieve a smooth, conductive surface.



RF Machined Housing

Overview & Process Cont'd

RF machined housings are produced through precise machining processes, careful design, material selection, and RF performance testing. These housings are integral to devices requiring high-frequency signal management and electromagnetic interference shielding, and they are crucial in industries such as telecommunications, aerospace, military, and electronics.



Vacuum & Dip Brazing

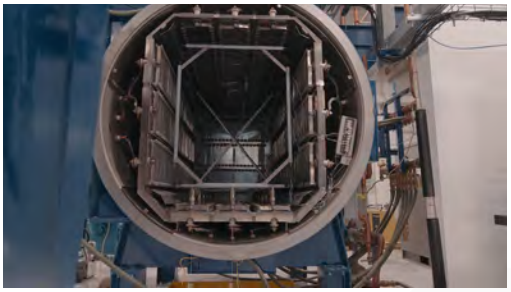
C/A Design provides quality brazed compact heat exchangers, cold plates, CNC machined components, electronic enclosures, and engineering services to the Defense Industry. C/A Design is an Innovator and leader in the Brazing industry. Our customers rely on us to deliver the complex parts they create.

Vacuum & Dip Brazing

Vacuum Brazing

AWS C3.7/ AMS2678

Vacuum brazing is a sophisticated process that ensures the highest integrity of metal joints. By heating components in a vacuum chamber, oxygen is eliminated, preventing oxidation and contamination. This method results in exceptionally clean and strong joints, making it ideal for high-reliability applications such as those in aerospace and defense sectors. The purity of the bonding process ensures that your components are joined with unmatched strength and durability.



Applications in Aerospace and Defense

- Our brazing services are ideally suited for a variety of aerospace and defense applications, including:
- Aircraft Components: Enhance safety and performance with joints that withstand extreme conditions.
- Defense Systems: Achieve structural integrity and reliability in critical defense equipment.
- Complex Assemblies: Optimize designs for peak efficiency and durability in demanding environments.

Dip Brazing

AWS C3.7

Dip brazing is a specialized process for joining aluminum components that involves immersing assemblies in a molten salt (flux) bath. Each joint contains a specialty brazing alloy, which melts at a lower temperature, allowing the alloy to flow through the joint, forming a permanent, high integrity bond. This method is particularly effective for achieving strong and reliable joints, even in the most complex assemblies.

By adhering to our industry leading design and assembly guidelines and specifications of the AWS C3.7 standard, we guarantee high-quality and consistent results for every project.

Applications in Aerospace and Defense

Our dip brazing capabilities are ideally suited for a range of applications, including:

- Thermal Enclosures: Dip brazing creates lightweight, high performance thermal enclosures to house sensitive electronic systems that are essential to aerospace and defense applications such as electronics card cages and chassis.
- Housings: Achieves superior properties for mass, structural integrity, and reliability essential for mission-critical systems such as sensors, switches, and countermeasures.
- Advanced Assemblies: Create advanced multi-brazement assemblies to minimize space, maximize performance, and durability of complex systems in demanding applications such as Electronic Warfare (EW) and Electronic Attack (EA).

Conversion Coating

MIL-DTL-5541

Our conversion coating process, guided by the MIL-DTL-5541 standard, involves treating aluminum and its alloys with a precision chemical solution. This process forms a durable protective layer that significantly enhances corrosion resistance and improves paint adhesion, ensuring your components withstand the harshest conditions and maintain optimal performance.

Applications in Aerospace and Defense

Our conversion coating services are ideally suited for:

- Aircraft Structures: Ensuring longevity and reliability of components exposed to varying altitudes and climates.
- Military Equipment: Providing essential protection for mission-critical hardware against corrosion and wear.
- Aluminum Assemblies: Optimizing the performance of complex systems in challenging environments.

Aluminum Heat Treating

C/A Design offers industry leading aluminum heat treating capabilities, designed to meet the rigorous demands of the aerospace and defense industries. Our commitment to quality ensures that your aluminum components achieve superior mechanical properties and performance through our state-of-the-art heat-treating process.

Our industry leading process utilizes a state of the art, fully automated Horizontal Quench System (HQS), custom built to our specifications to solve the unique challenges of aluminum brazement heat treating. The HQS allows for unrivaled control over all inputs to the heat-treating process, leading to superior product quality and maximum throughput.

Advanced Machining

Our advanced CNC machining centers are equipped with the latest CNC control technology, including workpiece measuring capabilities, allowing for unparalleled precision and control over the manufacturing process. This advanced technology ensures that each step of the machining process is executed with the highest-level accuracy and repeatability, ensuring compliance to the most stringent requirements.

Advanced Machining

PALLETECH System

The C/A Automation System (CAAS) is the pinnacle of manufacturing automation, combining a sophisticated workpiece management solution for handling, and storing workpieces, and modular high repeatability quick-change fixturing. This integration ensures continuous, unattended operation, allowing production to run smoothly and efficiently, even in a high workpiece mix environment.

Key Features of the C/A Automation System (CAAS)

- Success by Design Approach: Thoughtfully designed fixturing, tooling, and machining approaches that provide the highest level of quality and process repeatability while maximizing overall system flexibility and throughput.
- Advanced Workpiece Managment: Automated workpiece storage allows for multiple components and setups to be stored in queue, providing the ability to support high-mix and or high-volume production.
- Sophisticated Scheduling Software: Maximize productivity with advanced software that prioritizes urgent parts, ensuring efficient workflow and maximum throughput.

Why Choose the C/A Automation System (CAAS)?

- Enhanced Productivity: Leveraging our well designed, highly automated solution to meet the strict requirements of the Aerospace and Defense industries provides maximum value by maintaining superior quality and throughput, while reducing overall production cost.
- Product Lifecyle Support: CAAS provides maximum product life cycle support due to the highly efficient and highly repeatable process. Efficient and cost-effective production can be supported throughout the product life cycle. From prototypes to LRIP and FRIP, the CAAS can support the production requirements.

Precison Turned Components

At C/A Design, all precision turned components are produced using state of the art, twin-spindle, twin-turret, multi-axis, automated CNC lathes, offering unparalleled precision and quality.

The turning process involves the rotation of the workpiece while a cutting tool removes material in a precisely controlled manner to achieve the specified geometry and tolerance, in a wide variety of materials. The result is a component with an exceptionally accurate form and a superior finish, qualities that are demanded by the high-stakes industries we service.

- High Accuracy/Repeatability: Our precision turning process ensures that each component is produced to exact specifications, every time.
- Tight Tolerances: Tolerances as tight +/- .0001" can achieved
- Complex Geometry: Multi-axis CNC lathes utilize a combination of turning and milling technologies, allowing for complex geometries to be created in a single process.

The Advantages of 3, 4, and 5 Axis CNC Machining

- 3 Axis Machining: Cost effective solution for a wide variety of planar and prismatic geometries, offering a high level of precision for a wide range of workpieces.
- 4 Axis Machining: Allows the workpiece to be rotated about a single axis, allowing for more access to the workpiece in a single setup. Improved accuracy and machining efficiency for more complex geometries.
- 5 Axis Machining: Allows the workpiece to be rotated about two opposing axis for maximum access to the workpiece in a single setup. This provides the ultimate flexibility during the machining process and the highest level of precision for the most complex geometric requirements.

Advanced Thermal Products

C/A Design specializes in creating high-performance thermal management solutions, combining advanced engineering, precision manufacturing, and material expertise. By focusing on thermal efficiency, customization, and quality, C/A Designs produces a wide range of products—including Liquid Cold Plates, Aluminum Extruded Heat Sinks, Air Movers, and Thermal Interface Materials—that are essential for keeping electronic and mechanical systems cool and operating at peak performance.

Advanced Thermal Products

Heat Pipes

Heat pipes are used to transport heat over a distance with very low thermal resistance. This is very helpful when small or distant heat sources need to be dissipated over a larger area or moved to a remote heat exchanger. Heat pipes are a Fluid Phase Change application, often referred to as “re-circulating,” because they use a closed loop to transfer heat quickly through evaporation and condensation within the heat pipe.

Heat Pipes Variations

There are many types of wick structure that can be used within the heat pipe and they are generally classified into grooved, mesh, powder and hybrid. A **grooved heat pipe** is a copper tube with a series of shallow grooves around the internal perimeter of the heat pipe. While the water is a liquid, it travels in the grooves and while it is a vapor it travels in the open space of the pipe. Grooved pipes can be used in horizontal orientations, but are very limited in performance if used above 15° out of horizontal. A **mesh heat pipe** is a smooth wall copper tube with a woven copper mesh installed along the interior of the pipe. The mesh is designed to remain in contact with the walls of the pipe in areas where the pipe may be bent or flattened. Mesh pipes can be used in horizontal and orientations up to 30° out of horizontal. A **powder wick heat pipe** can also be known as a sintered heat pipe. During the manufacturing process a mandrel is installed in the center of the pipe and copper powder is poured into the pipe around the mandrel.

Mesh Heat Pipe

Grooved Heat Pipe

Powder Wick Heat Pipe

Air Movers (Fans)

C/A Designs begins by analyzing the cooling requirements, including airflow, pressure, and noise level. Based on this data, they select the appropriate fan size, type (axial or centrifugal), and speed for optimal performance.

The fans are designed to meet specific environmental and application requirements, such as low-profile designs for tight spaces or high-static-pressure models for systems with restricted airflow.

Fans are assembled with high-quality motors, blades, and bearings, and the components are selected to balance durability, noise reduction, and performance.

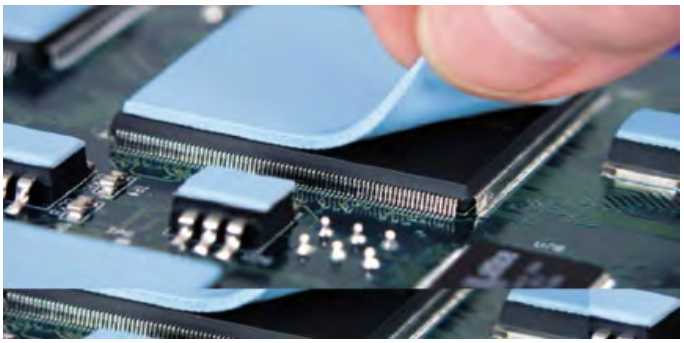
To ensure they meet the operational specifications, air movers undergo vibration, airflow, and noise testing before they are approved for use in critical applications.

Thermal Interface Material (TIM)

C/A Designs offers a range of TIMs, including thermal pastes, pads, and films, to facilitate efficient heat transfer between surfaces. The right material is selected based on factors like thermal conductivity, ease of application, and the environment in which the product will operate.

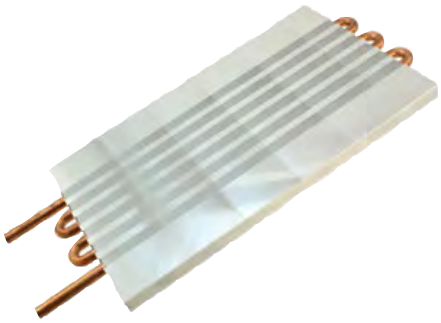
Thermal interface materials can be customized to meet specific needs, such as adding pressure-sensitive adhesive for easy installation or tailoring the thickness to fit the application.

TIMs are produced using precise processes like casting, screen printing, or lamination to ensure uniform thickness and consistency. The materials are designed for high thermal performance and long-term reliability.



Liquid Cold Plates

C/A Designs engineers optimize the liquid cold plate's internal structure to ensure efficient heat transfer, often using a series of micro-channels to guide the coolant. The design balances fluid dynamics and heat dissipation to ensure maximum thermal performance.



Materials such as copper, aluminum, or stainless steel are selected for their high thermal conductivity and resistance to corrosion. The choice of material is based on the application's needs, such as durability in harsh environments or weight constraints.

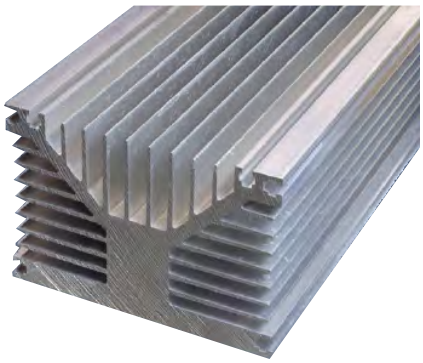
The cold plates are typically machined with high precision, often using CNC machining or extrusion to create the intricate internal channels. For high-performance applications, C/A Designs employs techniques like brazing or welding to join parts and seal the cold plate. In some cases, additive manufacturing may be used to produce complex, custom designs.

Aluminum Extruded Heat Sinks

C/A Designs starts by performing thermal simulations to analyze heat dissipation and airflow for each unique application. Based on this analysis, the geometry and fin design of the heat sink are optimized for maximum heat transfer.

Using an aluminum extrusion process, C/A Designs produces heat sinks with uniform cross-sections, allowing for cost-effective mass production. Aluminum is chosen for its excellent thermal conductivity, light weight, and corrosion resistance.

The extruded heat sinks can be customized by machining or adding features like mounting holes, grooves, or fins to improve thermal performance or allow for easier integration into specific systems.



The heat sinks undergo surface treatments such as anodizing or powder coating for improved durability and corrosion resistance, and to increase the surface area for heat dissipation.

Contact

Whether you're looking for answers, would like to solve a problem, or just want to let us know how we did, you'll find many ways to contact us right here. We'll help you resolve your issues quickly and easily, getting you back to more important things.

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