



## CORDION PANEL APPLICATIONS

Cordion's technology can create folding products and systems that are strong, lightweight, and compact when folded. Cordion's technology can be used in a broad range of applications, and this list is intended to help stimulate creative thinking on these, and other possible projects.

### Maritime

#### MARITIME APPLICATIONS

- Folding Rescue & Expeditionary Craft
- Compact Recreational Folding Boats
- Seasonal Rental Craft
- Floating Piers/Docks

### Agricultural

#### AGRICULTURE APPLICATIONS

- Compact Processing, Sorting, and Harvesting Platforms
- Temporary Silos and Fluid Storage
- Folding Loading Ramps

### C4ISR Communication & Radar

#### ANTENNA APPLICATIONS

- Portable Radar Systems
- Counter-UAS Radar
- Multistatic Weather Radar
- Ground/Wall Penetrating Radar

#### C4ISR

- Compact EW

- SIGINT

- Area Threat Detection/Monitoring

- USV/UUV and Submarine

- Mast-mounted Deployable Antenna Systems for various applications

#### EMF/EMP PROTECTION

## **Logistics & Infrastructure Support**

### **LOGISTICS SUPPORT**

- Bridging Systems/Ramps**
- Landing Pads**
- Temporary Runway System**
- Extreme Environment Protective Shelter Systems (snow, ice, tundra, mud, sand)**
- Temporary Flooring system**
- Disaster/Refugee Housing**
- Multi-Use Panel**
  - Personal & Vehicle-Mounted**
- Load Deck/Cargo Control Panels for (ship, rail, truck, etc.)**
- Barrier Systems**
  - Crowd Control**
  - Traffic**
  - Flooding**
- Fluid Storage Tanks**

### **RENEWABLE ENERGY**

- Portable Solar Thermal (power, water)**
- Folding PV Panels**
- Wave Power Generation**

### **SEISMIC REINFORCEMENT PANELS**

### **BALLISTIC PROTECTION PANELS**

- UGV Armor Systems**
- First-responder Protection**
- Overhead Protection Systems**
- Folding Personal Shield**
- Mobile Mantelet**
- Armored Structure System**
- Architectural Walls/Doors**
- Hangar and Blast Doors**

## **Aerospace**

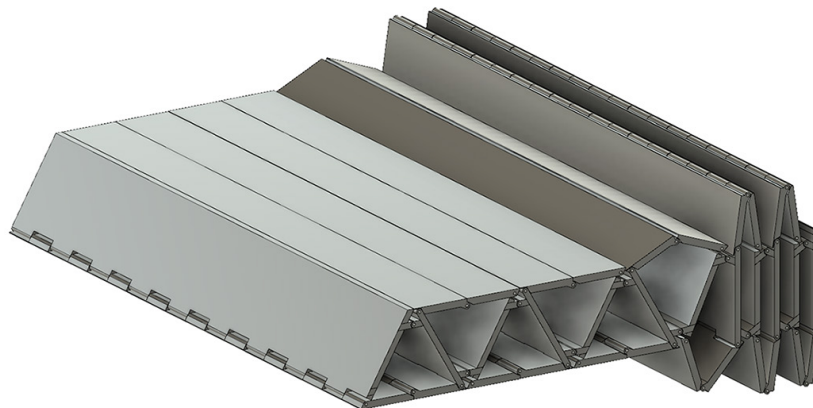
### **AIRCRAFT APPLICATIONS**

- Cabin/Compartment Doors**
- Hatches**
- Compact Seating**
- Control/Lifting Surfaces**

### **CORDION DECELERATION DEVICE**

### **SPACE APPLICATIONS**

- Radiative Cooling Panels**
- Antennas**
- Compact Structural Panels**
- Extending Grid Fins**



## Maritime Applications

For these applications, both the compact nature of folded Cordion technology and the inherent strength of the truss section are important.

### Folding Rescue/Transport Craft

Multi-purpose folding rescue and transport craft can be made using Cordion technology. These can range in size from **small (approx. 15')** rescue boats to **lightweight folding landing craft**. A larger Folding Rescue/Transport Craft (approx. 30') **capable of carrying light trucks, HMMWVs, and ambulances up to 15,000 lbs**, or 20 or more people and gear, can fit into approx. **4'x6'x18' volume** for storage and transport. Smaller craft equivalent to **16' RIB can fit in the back of a pick-up truck**. This versatile design is an ultralight, folding landing craft with capabilities to retrieve flood victims off roofs and from the water. The lowering front ramp allows roll-on/roll-off access to wheelchairs in smaller sizes and ambulances and Humvees in larger lengths. The C-RAFT is self-bailing, rugged, and able to be beached and used safely in shallow waters which may conceal dangerous debris that could puncture or harm a conventional inflatable boat or RIB. **The compact folded volume of the Cordion-based design will fit a dozen Boston-Whaler-sized runabouts into a 24' shipping container**, with the ability to deliver scores of rescue craft to a flood zone, or utility and patrol boats to support troops, incredibly quickly and efficiently. Large numbers of rescue craft can be stockpiled in anticipation of flooding events along coasts and rivers in far smaller areas and with greater protection — Greater protection of the boats when stored, and greater protection of victims when floods or hurricanes strike.

The versatile nature of Cordion technology allows us to design folding hulls for faster, more maneuverable boats. **Tri-hull and vee-bottomed shapes make folding fast patrol and rescue craft possible**. Boats which might be too large or unwieldy to tow on the highway can be fit on much smaller trailers and transported without restriction.

### Compact Recreational Folding Boats

Folding boats with far greater capabilities than current products can be produced with Cordion technology. R.Vs and campers can carry compact transport craft like those above, with the ability to **drive a quad aboard the expanded boat and carry it across remote lakes and streams to explore far greater areas and open up new recreational opportunities**.

More traditional shapes similar to Tri-hull, Boston-Whaler-type boats are able to fold into flat sections for compact storage and transport. Center-console bass boats, vee-bottomed runabouts with small cabins forward for overnight and weekend cruising — A whole range of exciting, popular boat types which can be folded into highly compact volumes for storage and transport!

## **Seasonal Rental Craft**

All of the compact storage advantages of boats designed with Cordion technology mean that greater numbers of rental craft can be stored for seasonal opportunities, or moved from location to location more easily to meet demand.

## **Floating Piers/Docks/Platforms**

Simple floating pier or dock structures **can be stored in approximately one-quarter the volume of solid floating structures.** When deployed, they can be far more resilient and stable than a simple inflatable float for a dock or pier. Recreational swim platforms are a very simple application for ponds, lakes, and rivers. In areas where they must be taken out of the water during the winter months, Cordion-based platforms could be stored in far smaller volumes and out of damaging winter weather.

# **Agricultural Applications**

## **Temporary Silo and Fluid Storage Systems**

Compact circular Cordion sections can create tank and silo wall structures which can be erected on-site quickly to act as temporary storage of harvested grains or to serve as reusable, mobile, temporary fluid storage tanks for fuels, fertilizers, etc. Temporary water tanks for livestock could be moved to accommodate varying grazing areas or seasonal needs, easily carried in the backs of pickup trucks.

## **Harvesting/Sorting Platforms**

Cordion panels can create compact, folding tables and platforms for use in the field. These can be quickly deployed when needed.

## **Portable Folding Ramps**

Folding Cordion panels for easy storage of compact, multi-use ramps for loading animals, supplies, vehicles, etc.

## Aircraft Applications

As with the Maritime Applications, both the structural and the space-saving abilities of Cordion technology are equally important.

### Cabin Doors and Hatches

Cordion technology can improve the efficiency of these systems greatly. **A Cordion door can be opened without obstructing movement in other passageways**, yet not require a “dead space” as a pocket door would. Unlike a soft folding door or hatch cover, Cordion technology produces a solid, strong panel when extended.

### Compact Seating, Ramps, and Cargo Decks

These components can take up far less internal volume when stored. Cordion technology panels can create solid, extendable cargo decks/shelves for tiered loads, or vertical barriers to separate cargo while controlling shifting. Ramps can be stowed much more compactly.

## Space Applications

In these uses, Cordion technology’s ability to reduce structural component volumes and weight is more important than the shape-changing nature.

### Radiative Cooling and Structural Panels

Compact folding of **large radiative cooling surface areas** can potentially also be structural elements of a spacecraft. Strong, lightweight panels for simple structural uses can be stowed in more compact volumes.

### Folding Antenna Systems

Many of the various compact folding antenna systems listed above can be used in space-based applications.

### Extending Grid Fins

Cordion technology could be applied to **compact, deployable grid fins** for aerospace applications.

## Cordion Deceleration Device

The geometry of Cordion technology can be used in a very different way from the panel applications to **create a system to decelerate moving objects in a controlled, tuneable manner**. These systems could be used to protect moving objects from uncontrolled deceleration: **air-dropped loads, roadway barriers, even to help cushion the landing of spacecraft**. For cargo applications, the system can be both potentially **reuseable, and tuneable** to match varying requirements in **both mass and rate of deceleration**.

## Folding Antenna Systems and Applications

Cordion technology is most effective for its ability to transform in shape and volume for these applications, and its strength is a secondary benefit.

### Folding Flat Panel Antenna Systems

Cordion technology can be used to create **compact antennas** for improved tactical applications. **Phased-array radar antennas** can be stored in much smaller volumes than solid counterparts, allowing larger antennas for greater accuracy and resolution. Cordion folding flat panel antennas can be patch array, or compact **Log-periodic or Yagi-Uda type antennas**. Many variations are possible, including multiple antennas in one system (dual polarization in one compact panel).

Cordion folding antennas can be used to improve existing Counter-UAS systems and allow new capabilities. **C4ISR, EW, and SIGINT applications** can benefit from Cordion folding antennas. Cordion technology can create large antennas that can be carried on smaller vehicles and reduce warfighter loads. The compact nature of Cordion allows much larger antennas to be deployed from **USV/UUVs** and submarines for **more covert SIGINT and EW decoy use**.

### Folding Circular and Parabolic Antenna Systems

In addition to the flat panel antenna systems, Cordion technology **can create curved shapes**. Circular or parabolic trough antennas can be folded to store flat in much more compact volumes. Direction-finding, sector antennas, and many other ring antenna applications can be much more tactically effective with Cordion technology. Parabolic trough antennas for compact, high-gain antenna systems for C2 and EW applications can be transported more easily, allowing greater capability for warfighters.

### Submarine Applications

Cordion technology allows for compact folding of **large antenna areas** which would otherwise be impossible to deploy through submarine hatches. Mast mounted antenna systems capability can be improved with Cordion technology.

## Compact Sensor Arrays

While Cordion technology can provide many unique advantages to antenna systems for RF applications, it can offer **similar improvements to non-RF sensor arrays** for scientific, commercial, and defense users.

## EMF/EMP Protection

Cordion technology can create **extendable barriers for protection from EMF/EMP events** (Faraday-cage-type structures), as well as rapidly deployable cyber-protection for military and civilian users. Cordion technology's structure allows for many internal reflective surfaces and potentially very **light-weight, effective armor for protection against directed energy weapons**. Multiple layers of material can be deployed, yet still fold to a compact volume for storage.

## Logistics Support

In these applications, Cordion technology is used both for its strength and its ability to fold into compact volumes for more efficient storage or transport.

## Light/Medium-duty Portable Bridging Systems and Ramps

Bridge decking and load-bearing structures can be integrated using Cordion technology for a **portable, reusable bridge system** for spanning short to moderate distances for lighter vehicles and personnel. It can create a **much lighter, smaller, modular, more compact and versatile system** than a heavy, tank-rated bridge system.

## Landing Pads/Flooring/Decking

Cordion technology can be used to create **light, strong flooring systems** which can be stored and shipped in far smaller volumes than other systems. It can also be used for **rapidly deployable, solid decking/flooring** for soft ground or snow, **reusable landing pads** for helicopters, even **runway systems**, on a larger scale. Cordion technology can be used to create **compact, extendable decking for temporary docks and causeways**.

## Temporary Structure Systems

Cordion technology can produce **portable, compact shelter systems which are modular, expandable, and efficient**. These shelter systems can be used as **temporary housing, forward command centers, portable offices, as well as clean, dry, controllable medical facilities**. The addition of ballistic protection armor can add versatility.

## **Extreme Environment Protective Shelters and Walkway/Pad Systems**

Cordion technology can create structures specifically **designed for improved efficiency and greater utility in harsh climates** and sub-optimal terrain. High performance features can include **increased insulation** to protect both the occupants from freezing and the tundra or snow from melting. **They can provide stable shelter in soft sand or mud locations, or improved protection from high winds and dust.**

## **Modular Personal Multi-Use Panel System**

Cordion technology can create a **compact, versatile panel system for multiple uses**. Extendable panels can form **modular tables, sleeping platforms, wall/roof elements for insulated temporary shelters, and many more uses**. The addition of ballistic protection elements can result in far greater utility. There is the potential for **modular integration with Cordion-technology-based personal shields and Mantelet systems**.

## **Vehicle-mounted Multi Use Panel System**

Cordion technology can be used to create an **extendable, vehicle-mounted panel system for use as a table/work platform**. Rapidly deployable, it can be stored away compactly when not used, and integrated into various vehicle designs.

## **Load Deck/Cargo Separation Walls**

Cordion technology can create **strong cargo decks in ships/trucks/containers/rail cars**. They can be extendable when needed, allowing more versatility and efficient use of cargo volumes. **Vertical wall systems** can separate/secure loads within similar spaces.

## **Fluid Storage Tanks**

Cordion technology can be used to form **folding, reusable circular and rectangular structures to store liquids** (fuel, water, waste, etc.). **Ballistic protection elements can be added** to the Cordion structure to help secure the contents of the storage tanks.

## **Flood/Crowd/Traffic Barrier Systems**

Cordion technology can be used to produce **rapidly deployable barriers for temporary control of crowds, flooding events, etc**. These strong, foldable barrier systems can be modular and versatile, yet compact when stored.

## **Seismic Reinforcement Panels**

Cordion technology can create a **simple, fast reinforcement system for columns, walls, and other civil engineering applications**. Cordion technology is very well suited to create structural wraps and **panels to strengthen architectural elements** before an earthquake. or provide rapid temporary repairs after a seismic event.



# Renewable Energy

## Portable Solar Thermal Energy Capture

Compact, portable parabolic trough concentrating solar systems can be deployed to provide heat for **hot-water supply, structure heating, electrical power generation, and water purification systems.**

## Folding PV Panels

Photovoltaic cells can be incorporated into Cordion technology based panels, either as stand-alone PV panels, or as **part of other systems (Temporary Structures, Multi-use Panels, etc.)**

## Wave Power Electrical Generation System

Cordion technology can be used to produce a system of **floating offshore structures which generate electrical power from the undulation of sea swells.**

## Ballistic Protection Applications

Cordion panels can incorporate ballistic protection elements and can be made bulletproof in varying degrees, depending on the requirements. In addition, the nature of Cordion technology allows it to perform in multiple ways at once, as in the case of the Armored Structure System application, which needs to be robust and structurally sound while protecting materiel and occupants from attack.

## UGV Armor Systems

Cordion panels can provide **extendable armor protection for soldiers behind a moving, unmanned drone/robot vehicle.** Cordion technology can reduce the overall bulk considerably, while offering a greater area of protection for troops. Configurable, remotely deployable armor panels allow greater accessibility in close quarters (urban environments, within buildings, etc.)

## First Responder Vehicle Protection

Cordion ballistic protection panels can provide **rapid protection for vehicle windows,** as well as possible **vehicle-mounted barriers for cover and mobile firing positions.** Cordion technology can also be used in modular cover systems for utility vehicles to allow multi-use, configurable truck systems.

## **Folding Shield/Mantelets**

Cordion ballistic protection panels can be made in smaller sizes, suited to **lightweight, folding shields**. These shields allow rapidly deployable protection which can be stored in vehicles much more easily and compactly. They can also be cached in buildings/offices, and offer rapid cover for advancing troops and SWAT teams.

**Mantelet systems are slightly larger two or three person mobile firing positions** which can be folded and secured in vehicles or stored easily in guard rooms, etc. Both Mantelet systems and shields could integrate with modular, multi-use Cordion panel systems to form ad-hoc shelters, very light weight bridges, work platforms, etc.

## **Armored Structure Systems**

Cordion technology can create light arms fire rated protection for **compact, expandable shelter systems**. There are two possible methods of application of Cordion technology in shelter systems and housing: As an **integral part of the expandable wall system**, or as an **external, Cordion-based containment method for simple sand/gravel barrier walls**. Larger-scale Cordion barrier systems could be used for perimeter defense walls/barriers.

## **Architectural Armored Wall/Door Systems**

Cordion technology can create **extendable shelter-in-place protection systems, armored doors, and rapidly deployable “safe rooms”** for various architectural applications. **Larger-scale deployable barrier systems** can protect corridors, hallways, building entries, and other larger spaces in theaters, airports, offices, etc.

## **Hangar and Blast Doors**

Cordion-based door systems can offer high strength for wind loads, ballistic protection, and other requirement of hangars and storage facilities.



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