

inrekor™ - Innovative Sandwich Panel Structure Technology

INREKOR helps make your existing structures
lighter and stronger, whilst reducing costs
and enhancing build predictability.

Overview

inrekor™ produce **finished, bespoke panels** to customer specification, which can then be bonded together to form final structures.

Completed panels can be sent flat-packed direct to the customer for final assembly, or alternatively can be bonded together at our facility to produce finished, integrated units.

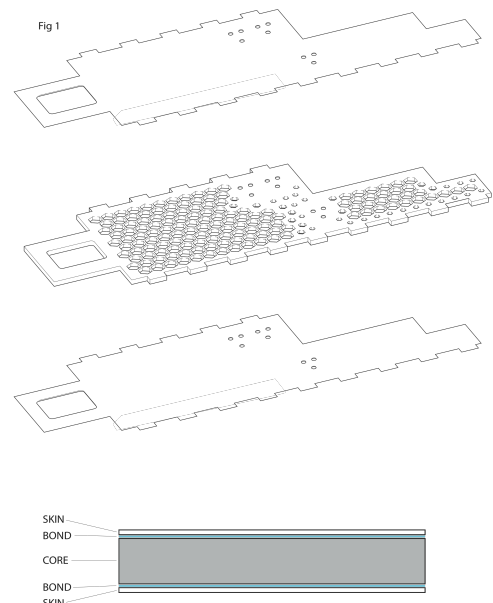
Sandwich panel technology has always been respected for its high strength to weight ratio, and INREKOR moves this forward, enabling production of cost-efficient structures with excellent build repeatability and reduced BOM (Bill of Materials)

Construction

inrekor™ is made of three layers - a top skin, a bottom skin, with an ARPRO® core bonded between these.

The top and bottom skins can be made from many different materials, but aluminium and stainless steel are norms for optimising performance under dynamic conditions. Choices of skins and cores are tuned to match customer requirements.

The Core is made from ARPRO® - a variable density, closed-cell expanded polypropylene. This material is manufactured globally by JSP our technology and manufacturing partners, and is already present in most vehicles produced today.



More data on ARPRO is available at <http://www.arpro.com/eu/tech-docs/tech-docs.php>

How inrek^{or}™ produces a panel

The skins and the core are manufactured separately and then bonded together to form the unified, finished panel. Panels are carefully aligned and bonded under heat and pressure using specially developed adhesives, in a streamlined manufacturing process controlled by inrek^{or}™.

For **low to medium volume** production, skins and cores are cut using high-speed laser or water cutting technology, which requires no tooling investment. This route can produce one-off prototypes or up to several thousand units per year, both on a cost-effective basis.

For **high volume** production, skins would be stamped or pressed into shape, and cores moulded. The tooling required for both parts is not expensive compared to more traditional approaches.

For **3D panels** additional tooling will be required for delivering complex structural curvature, but panels with folds are easily achieved.

How can I start using inrek^{or}™?

After signing our standard Non-Disclosure agreement, our technical team will advise on your CAD design, and work with you in determining how best to maximise inrek^{or}'s advantages - identifying joint specification, skin choices and anti-peel options to produce a specification.

Optionally, we can take your sketches, ideas or CAD outlines and produce fully worked inrek^{or}™ specifications, for an agreed design fee.

Once the design is agreed, a prototype can be rapidly produced which will match the production version very closely. Once approved, the panels are made to order by inrek^{or}™.

Main inrek^{or}™ benefits Strong & light structures

An inrek^{or}™ panel alone has the same performance properties as mainstream sandwich panels, but bonded perpendicularly with other inrek^{or}™ panels **increases strength and rigidity tenfold**. Thus, carefully designed sub-chassis elements can be integrated to complete the structure and transmit forces into the strongest core components.

The inrek^{or}™ panel bonding approach **overcomes fatigue** by avoiding the uni-directional point contacts which traditionally fail over time on honeycomb panels. inrek^{or}™ becomes a real option for dynamic, mainstream sandwich-panel use.

Unlike space-frame structures, inrek^{or}™ is able to **translate forces uniformly** (isotropic character) across the panels, allowing for lighter construction overall.

The advantages of inrek^{or}™ are not simply in the material itself, but in the **design flexibility** which combines joint and anti-peel technology from the outset to create long-lasting, strong, light structures.

Joints are usually bonded tongue and groove pattern, and as each skin is produced separately joints are positioned to **maximise geometric strength**, bringing massive mechanical enhancement to critical points. Panels can also be designed to 'self-jig', thus allowing easier external bonding between panels, with reduced assembly fixtures.

Peel has always been an issue with the exposed edges of sandwich panels, but inrek^{or}'s patented skin adaptability process successfully overcomes this.

Cost efficiency

Traditional machining-away to produce a panel profile is a wasteful process, and when combined with the labour intensive use of CNC routing/cutting becomes expensive. inrekor's utilises the latest in water or laser cutting machines for low volume applications to produce both skin and core profiles without the need for tooling investment. With larger production volumes unit costs are reduced by punching or pressing skins and moulding cores. Quality, consistent results are achieved through both routes at low cost.

The Environment

Individually, the core and aluminium skins are **100% recyclable**. The production of the core itself is **entirely non-toxic**. Energy involved in inrekor's panel creation is a fraction of that expended in traditional processes.

Panel intelligence

Careful design from the outset enables **affordable bespoke features** to be incorporated into each inrekor's panel, overcoming many traditional sandwich panel shortcomings. For example, ducting and fixing points can be built in at very little cost, to produce what we call 'panel intelligence'.

Safety performance

The isotropic nature of the core itself absorbs energy far better than traditional materials. The core material has been at the centre of car bumper and headrest applications for over twenty-five years.

Other inrekor™ Benefits

2D surfacing - as standard

Noise insulation - closed cell core reduces noise and vibration

Thermally and electrically insulative

Fire retardant properties - does not easily ignite (has no flash point)

Repetitious accuracy - within +/-1.5 mm on 'B' surfaces provides build predictability

Flat packed delivery - construct on site and save on logistics

Off-the-shelf - widely accepted materials

Tooling - no capital expenditure from the beginning in most cases

Simple predictable construction

Energy efficient processes - Bonding instead of welding

Sub Chassis Connectivity - special load washers allow forces to be transmitted into the panels

Flexible design - change CAD and get new panels with little impact on cost

Performance data

Inrekor has undergone extensive independent validation at WMG (Warwick Manufacturing Group) and testing at MIRA (Motor Industry Research Association) both in the Midlands UK.

Data sheets will be available to you in due course to download from the website.

Applications

Inrekor works with any structure where lightweight is an advantage whether its is low volume or mass production.

Typically all transport applications have a benefit to be lighter, this also extends to logistics where lightweight containers will save fuel whether they are transported by land sea or air.

Further areas include:

Building & Construction

Aviation

Marine

Logistics

Railways

Defense

Caravans

Trailers

Automotive