

Making your  
products stronger,  
lighter and smarter



**Diab**

# Design a different world

If you can imagine it, we can probably help you build it. Diab's high-performance solutions can take your products to a higher level of competitiveness by making them stronger, lighter and smarter. Combining advanced sandwich composite materials, tailored kits, a wide range of finishing options and a comprehensive range of engineering services, we make it possible for you to develop your wildest construction dreams in a cost-efficient and environmentally sustainable way.



# The ultimate building material

The volume and number of applications of composite materials are growing steadily, continuously penetrating new markets. Lighter than concrete, steel, aluminium and bricks, composite materials provide great weight reductions while maintaining strength. They combine full design freedom with exceptional durability. Plus they are actually more environmentally sustainable than conventional building materials.

## **Lightness and strength**

Who says a strong structure has to be heavy? Engineering dreams can meet harsh reality without any compromises. Sandwich composites significantly reduce weight and increase stiffness, while maintaining or even adding strength. Other materials, such as monolithic composite laminates, aluminium or steel, can result in applications that weigh two to ten times more than sandwich structures.

Increasing the thickness of the sandwich core yields even greater toughness and rigidity without substantially increasing

weight. And since the support structure can be reduced, there are further weight reductions to be made.

## **Full design freedom**

Do you have innovative design dreams that you have yet to realize? With sandwich composites you can enjoy a tremendous freedom to adapt both form and function to your specific application needs without any loss of performance or strength. You can easily incorporate compound curves and accurately align outer skins to load paths, maximizing structural integrity and performance.

## **Simply smarter**

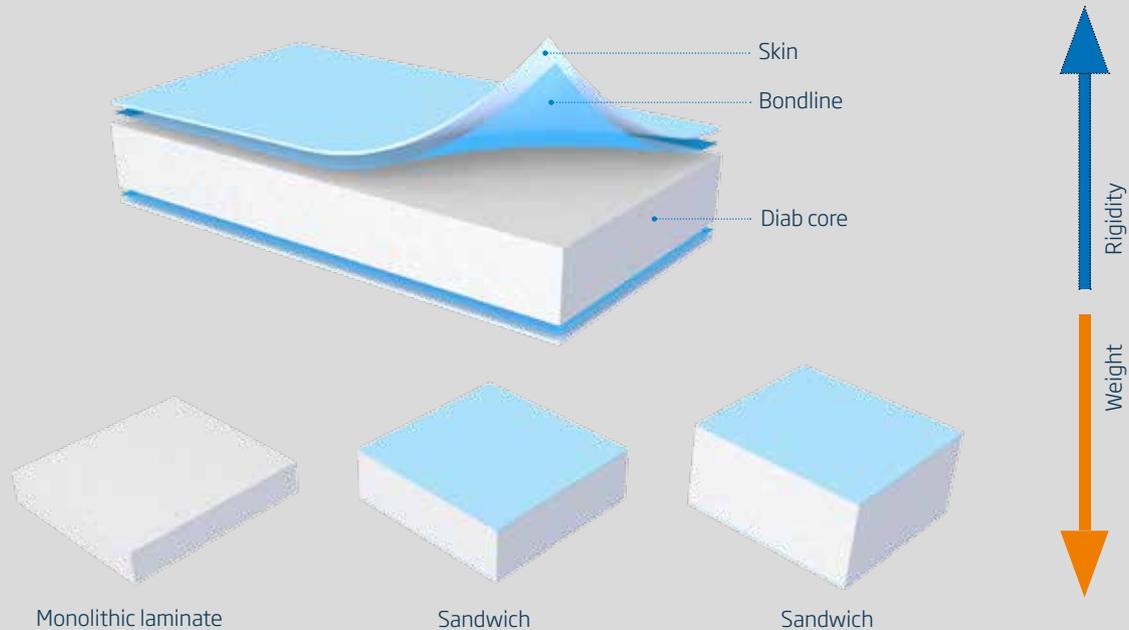
The excellent stiffness and strength-to-weight ratio of the sandwich concept serve many ends. Diab's advanced core materials enable higher speed, longer range, greater payload capacity, reduced power demand and reduced environmental impact. They also offer good dynamic strength, low water absorption and excellent insulation while minimizing maintenance.

## This is how it works

Generally, a sandwich composite consists of two high-strength skins or facings separated by a core material. The skins take up the bending stresses and give

the structure a hardwearing surface. Diab's lightweight core material absorbs the shear stresses generated by loads, distributing them evenly over a larger area.

## The anatomy of sandwich composites



On our website, [diabgroup.com](http://diabgroup.com), you will find more information about sandwich core composites, their benefits and applications.

# Diab – leading the way

Diab has been a frontrunner in developing composite materials for over 60 years. We know that each application requires a unique solution. Decades of experience serving various types of industries give us invaluable insight into your products and processes, making it possible for us to deliver a solution adapted to your specific needs.

## **Proven performance**

You can rely on us. We provide security and proof of performance few others can offer. Our excellent track record proves the quality and reliability of our materials, which are certified to relevant industry standards.

## **Driving innovation**

With our thorough knowledge of the market and our dedicated R&D facilities, we are always at the forefront of our industry. By consistently working to bring you every advantage – from long-term research in cutting-edge technology to continuous development and improvement of all our products and services – we aim to meet your needs, now and in the future.

## **Quality and efficiency**

We want to help you reach continuity and high standards in all your projects. That is why product quality and production efficiency are the watchwords at every Diab manufacturing plant. We are constantly striving to develop our processes in order to reduce costs and improve quality. To that end, Diab invests heavily in state-of-the-art production equipment and a skilled, dedicated workforce. We continually train all employees to maintain the dynamic and entrepreneurial spirit that makes Diab unique.

## **Worldwide supply and support**

We are where you need us to be. Through global manufacturing, sales and engineering presence, we want to be close to you and make a truly positive contribution to your operations. Our supply chain benefits from our strategically placed

manufacturing units around the world. You can also enjoy highly localized service through our support offices. To ensure full coverage, we cooperate with agents and distributors in selected markets.

## **Expansion with stability and commitment**

You can trust that we keep our promises, now and in the future. Partnering with Diab means that you get access to our technically advanced offerings as well as our thorough knowledge of the market. Our expertise, experience, service, commitment and drive to see your business develop and grow are key components in our concept.

As we stretch around the world, we take care to build a stable infrastructure, with a clear focus to deliver on our promises each and every time.



# Sustainability is at the core of our business

An integral part of Diab's business concept is that products and services should have a positive environmental impact in the applications and processes for which they are used. Most of the companies that use our products and services are striving for applications with light and strong designs. This brings positive effects such as reduced fuel consumption, increased range and greater load-bearing capacity.

We take the entire product life cycle into account in our research and development to ensure environmentally friendly products that are reusable and recyclable. We aim to reduce environmental impact on both a local and global level across all our activities. All Diab production plants work according to ISO 14001, and meet local, national and international standards regarding environmental issues.

# Choosing the optimal core solution

Do you want to make your products stronger, lighter and smarter? Choose from a wide range of high-performance core materials with different mechanical properties, material characteristics and densities that meet specific needs in a variety of industries.

## ▼ **Divinycell H**

Our most famous core. Excellent strength-to-weight. An all-purpose core used in various industries.

## ▼ **Divinycell HP**

High-temperature resistant core suitable for prepreg applications.

## ▼ **Divinycell HM**

High-performance core for tough environments, for example in fast marine hulls.

## ▼ **Divinycell Matrix**

Lightweight core with superior strength-to-weight ratio. Used in multiple industries, including wind and marine.

## ▼ **Divinycell H60MC**

Our latest innovation in lightweight cores. Incredibly fine cell structure for extremely low resin absorption and improved mechanical properties.

## ▼ **Divinycell P**

A recyclable PET core with excellent FST properties used in transport and construction industries.

## ▼ **Divinycell PN**

A recyclable PET core with excellent strength and durability.

## ▼ **Divinycell PX**

A recyclable cost-effective PET core material used in a variety of architectural applications such as domes and claddings.

## ▼ **Divinycell PN200, PN250, PX300**

High-density recyclable PET cores developed for local inserts in the way of fittings, either tapped or bolted through.

## ▼ **Divinycell PY**

Our latest addition to our recyclable PET portfolio with high shear strain and very low resin consumption.

## ▼ **Divinycell HT**

An aerospace core available with comprehensive quality certification and traceability.

## ▼ **Divinycell F**

A sandwich core with excellent FST properties, suitable in commercial aircrafts interiors.

### ▼ **Divinycell HCP**

Core material for subsea applications, used from sea level to 700 meters depth.

### ▼ **Divinycell CY**

A core with excellent insulation properties, for low and cryogenic temperatures.

### ▼ **ProBalsa**

Cost effective natural core with high compressive properties used in marine, wind and industrial applications.

Diab, Divinycell, Matrix and ProBalsa are registered trademarks in countries all over the world.

# Services that truly add value

There is more to a project than just the material. With our integrated range of solutions and services, we assist you in every step of the composite design and manufacturing process. Increasing your production efficiency and helping you to save cost and improve quality, we make your products stronger, lighter and smarter.

## **Kits to boost your performance**

To substantially increase efficiency, save cost and improve quality, all of Diab's materials can be delivered in ready-made engineered kits or any 3D shape. Each piece is pre-cut, shaped and formed as necessary and numbered to fit exactly into its designated place in the mold – eliminating the need for on-site shaping and cutting of flat sheets.

## **The right finishing saves time and money**

Selecting the correct finishing option in combination with the right kit can significantly improve cost, quality and efficiency. We offer a wide number of finishing options, including grid-scored, double-cut and grooved/perforated forms specially designed for the unique Diab Core infusion process.

## **Diab Core infusion**

Our unique core infusion process can cut mold cycles by up to 50% and labor costs by 30%. It can be readily introduced using existing molds and without the need for heavy capital investment or sophisticated flow modeling software.

## **Diab Technical Services**

Get the most out of your composite solution with Diab Technical Services. An excellent partner in terms of core, kits and finishing selection, Technical Services assist you in optimizing the full solution of your choice.

## **Composites Consulting Group (CCG)**

Do you want to take your ideas one step further? The Composites Consulting Group (CCG), an independent Diab Group company, provides specialty composite technology services, including design, engineering, testing, tooling, process optimization and training to make your design dreams come true.



# Diab – the knowledge leader

More than 60 years of experience in high-performance core materials give us perhaps the highest competence level in the industry. Take advantage of our accumulated expertise to improve your own products. On our website, [diabgroup.com](http://diabgroup.com), you can download our free knowledge guides that offer more information on core selection, kits and finishing.



# A multitude of applications

With several product lines, numerous finishing options and kit operations in combination with engineering service and expertise, we can help you achieve the most competitive low-weight, high-performance structures possible. Discover how composite technology can put you ahead in your industry.



## Aerospace

Low weight is of utmost importance within the field of aerospace. Diab's light and strong sandwich core solutions are therefore ideal for these applications. Used for commercial aircraft interiors, as well as primary and secondary structures for business and private jets, our solutions optimize the products' life cycle cost and decrease carbon footprint.



## Marine

Racing and pleasure yachts, workboats, ferries and navy vessels rely on Diab sandwich cores to achieve new levels of performance in terms of speed, strength, toughness, comfort, reliability and longevity. Divinycell cores provide excellent fatigue and slamming properties in sandwich structures, which makes them particularly ideal for rescue boats, coast guard vessels and other special vessels that often operate in high-sea conditions. These are the reasons why Diab is the driver of sandwich technology in the marine industry today.



## Subsea

Diab has been providing material solutions for subsea applications for more than 60 years. Our core materials can be used for many purposes in the oil & gas, subsea and oceanographic industries, providing the highest performance with regard to strength, buoyancy, insulation, water absorption and impact resistance. Based on your requirements, we help you develop buoyancy solutions from surface to seabed, or lightweight sandwich structures for offshore platforms.



## Transport

The benefits of sandwich technology in transport are easy to see. Lighter designs result in decreased fuel consumption, higher payloads and longer range, allowing for a positive impact on cost and a lower carbon footprint. Whether used for structural parts or paneling, Diab sandwich core technology offers an ideal way to reduce weight of anything that moves, e.g. trains, trams, buses and trucks.



## Wind energy

Application development in wind strives to get the levelized cost of energy (LCoE) below grid parity, making wind energy a globally competitive alternative to conventional fuel. Together with manufacturers and specifiers, and by combining core materials, finishing, kits, engineering and technical services, Diab helps in the production of market-competitive blades, nacelles and spinners.



## Construction

Providing a sustainable and economic solution, sandwich core technology and high-performance core materials allow you to create innovative façades and constructions in a cost-effective manner. Low weight, high strength, thermal and sound insulating properties, non-corrosive features and reduced need for supporting points, as well as fast and cost-efficient on-site installations, will benefit any construction project.

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## Other industries

Features such as high strength-to-weight ratio, excellent flexural rigidity combined with good insulation, very low water absorption and non-corrosion properties, bring endless opportunities to many fields. Diab can offer core materials that are ideal for **Liquefied Natural Gas (LNG)** storage tanks. Diab has a long-term, proven track record with Divinycell in insulation solutions for LNG carriers as well as land-based LNG storage tanks.

Another field that benefits from Diab's concept is **sports equipment**. Diab's core materials are used in surf, wake and windsurfing boards, cross-country, alpine and water skis, as well as hockey sticks. High strength at elevated temperatures and compatibility with all resin types make these cores suitable for the rapid production processes that the sports market requires.

Strong and lightweight, with good impact behavior and excellent resistance to harsh weather conditions, Diab core sandwich solutions can also be found in **radomes and antennas**.

Their light weight minimizes the need for supporting structures. Crucial for these applications are also the low and even dielectric properties of Divinycell materials.

# Working with the best of the best

Always at the forefront of composite technology, we have been privileged to participate in product innovation and development for some of the world's leading companies. The advances they have been able to make using our high-performance sandwich core composites and other solutions are truly exciting. Have a look at some of our success stories.



## **Pioneering the personal jet**

As the world's largest civilian aircraft manufacturer for private airplanes, Cirrus Aircraft is the only production airplane manufacturer that utilizes sandwich core composites in the primary structure of its planes. One of its jets, the Cirrus SF50, features an all-composites airframe and a sandwich construction based on polymer cores.

With room for one pilot and six passengers, the Cirrus SF50 was built using Divinycell HT, primarily due to its durability, formability and low finished part weight. Previous experiments with different materials had shown that Divinycell HT provided the best compromise of high-temperature process ability, damage tolerance from bird strike and best performance after impact.

## Light-weight Volvo XC90 ambulance

Nilsson Special Vehicles is one of Europe's leading builders of special purpose vehicles. Its new ambulances are based on the successful Volvo XC90 and will improve the working conditions for the staff. The body for the new vehicle is manufactured by Faiber Komposit in close cooperation with Nilsson Special Vehicles. The focus has been on producing a light and spacious vehicle without compromising the structural strength that is necessary for the heavy "on-board" equipment. With a combination of advanced



sandwich composite materials and the usage of RTM (resin transfer molding), Nilsson can offer a light-weight ambulance with maintained strength and greater stiffness.



## Glass-reinforced plastic in Ferrari Land

Ferrari Land in Salou, Tarragona, Spain, is the second amusement park of the Italian brand in the world. The design of this 70,000 m<sup>2</sup> theme park is striking, with a central building that simulates the front of a sports car. The massive structures of the amusement park needed to be robust, but light-weight. To keep strength without adding weight, the designers from MIRAPLAS, a Spanish-based

company specialized in composite materials, chose the PET core Divinycell P60 for the most spectacular designs that required more advanced technology to avoid deformation and buckling. Ideal for construction, such as interior paneling, floors and exterior panels for trains, trams, buses and coaches, the material also boasts good mechanical and Fire, Smoke & Toxicity (FST) properties.

## A ferry for sustainable sightseeing

Constructed in 2016 by the renowned Brødrene Aa for the Norwegian shipping company The Fjords, the hybrid-electric catamaran Vision of the Fjords can take tourists up Norway's beautiful coast in a both silent and sustainable way. It is the largest commercial passenger boat to be built in sandwich carbon fiber, with all structural elements made out of carbon sandwich laminates, including decks, walls, stairs and ceilings.

Vision of the Fjords was constructed using Divinycell H that provides excellent mechanical properties and low weight. The eye-catching vessel received both the prestigious award "Ship of the Year 2016" at the International Maritime Trade Fair SMM in Hamburg and the 2017 JEC WORLD Innovation Award.



On our website, [diabgroup.com](http://diabgroup.com), you will find more inspiration on how to make your products stronger, lighter and smarter.



Diab Group, Box 201, 312 22 Laholm, Sweden  
Phone: +46 (0)430 163 00 E-mail: [info@se.diabgroup.com](mailto:info@se.diabgroup.com)