Diab

WE'RE ALWAYS AT THE CORE OF YOUR WIND ENERGY

diabgroup.com

ALWAYS AT THE CORE OF YOUR SOLUTION

Diab was founded in Sweden in 1950.
Ever since the beginning, and throughout our steady development into a global company, we have been dedicated to constant innovation and promoting a widespread adoption of structural core materials.

Our products and solutions have been used in applications for marine, wind, aerospace, and industry for decades and are qualified according to relevant industry standards. With a complete range of high-performance core materials, numerous finishing options and kit operations in combination with engineering services and expertise, we present probably the widest and most valuable offering in the sandwich composite industry.

DECREASING THE CORE COST IN WIND ENERGY

Core is one of the primary materials used to construct composite wind blades, nacelles, and spinners. With the wind market focusing ever-more on the Levelized Cost of Energy (LCoE), manufacturers are continuously looking to reduce their operating costs and increase efficiency.
Applying Diab's core knowledge and products can help you achieve this. Ultimately, the right core, finishing and/or kit, effectively integrated into the manufacturer's process, can increase and optimize production capacity by reducing cost of materials and process time.

With decades of experience in wind energy solutions, Diab has gained invaluable insights into market needs. As a strategic and reliable partner, we have very long experience working globally with all major players within the supply chain, from the WTG OEMs to the designers, blade manufacturers (in-house, sub-contract or build-to-print) and kitters.

We are also adapting to the rapidly evolving needs of the ever-growing wind market, with high flexibility. We are a strong, long-established, and reputable global supplier, delivering solutions, in the region, for the region, to the highest quality and customer service standards. In short, we have the technical knowledge needed and the ability to apply it.

MORE SUSTAINABLE IN EVERY WAY

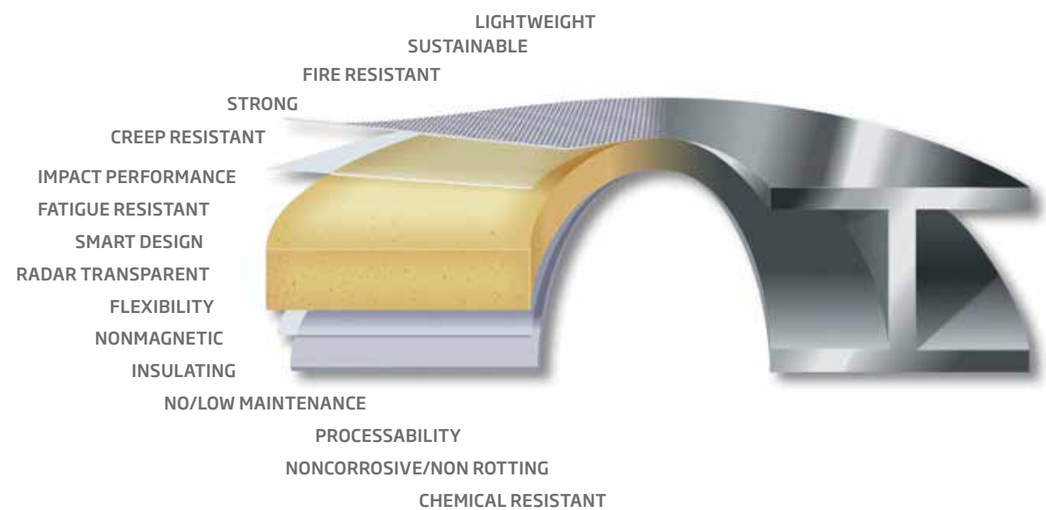
SUSTAINABILITY IS IN OUR CORE
Our products contribute to energy savings and a lower carbon footprint. They will help you boost energy efficiency, reduce emissions, conserve natural resources and create a longer life cycle for your product. Simultaneously, our customers in the marine market are setting increased demands for their suppliers in terms of quality, safety and environmental issues. At Diab we work hard to make a difference when it comes to sustainability. We are strongly committed to making your solution more sustainable in every way.

A PART OF THE RENEWABLE ENERGY SUPPLY CHAIN
Sustainability is one of our top business priorities. We are adopting to the responsible framework of UN Global Compact;
our Sustainability report is publicly available, and we have approval of our CO_2-reduction targets from the Science Based Targets Initiative. We strive to be a part of the renewable energy supply chain, and we also believe that this approach drives long-term profitability and competitiveness.

MAKE THE MOST OF YOUR APPLICATION

THE SANDWICH TECHNOLOGY
Composite materials are made from two or more materials with significantly different physical or chemical properties, that when combined, form an overall structure with characteristics different from the individual components.
The basic idea is simple; the execution is a bit more advanced. Two thin, strong and stiff skins, of fiber reinforced plastics or solid material, are attached to a lightweight core by press-bonding or lamination. This allows each element forming the composite panel to be designed to minimize weight and maximize strength and stiffness,
or other desired features. The result is a component with a very high stiffness-to-weight and high bending strength-to-weight ratio. A Diab sandwich has all the advantages of conventional materials, such as steel or wood, but none of the disadvantages, such as heavy weight, corrosion, or design limitations.

MASTERS OF SANDWICH CORE
In a typical sandwich panel the skins are taking tension and compression loads, and the core carries the shear forces. Our PVC and PET cores are engineered foams that absorb and distribute the loads exposed to the sandwich, static or dynamic . They have a stable closed cell structure resistant to water ingress, corrosion and decay, an important characteristic in harsh environments.
A variety of grades can be used to give the final product additional desired features, such as fatigue and impact resistance, fire resistance, insulation, radar transmittance and many more.
Diab offers the widest range of high-quality sandwich cores, but our true strength goes beyond the material. You can draw from our knowledge when it comes to anything from sandwich design to efficient production methods. With our experience and expertise you can make the most of your application, existing or new.



THE RIGHT CORE MATERIAL FOR YOUR NEEDS

Find the right material with our Core Selection Guide at **www.diabgroup.com**

Every application and manufacturing method has its special demand on the material used. To be able to get the most out of your product, Diab offers the widest range of core materials and grades with unique properties that will suit the needs of your wind applications today and tomorrow.

PET FOAMS

All our PET foams have excellent thermal stability, impressive physical properties and resin uptake properties.

Divinycell PN

A structurally strong PET sandwich core material perfectly suited in a variety of applications in the wind energy segment its excellent mechanical properties and good processing characteristics make it highly suitable for both blades, from the shoulder to the tip (PN115) and nacelles (PN80). PN200 and PN250 has been developed for the root sections of blades, as an alternative to balsa, to meet the increasing demand of tougher and stronger core materials.

Divinycell PY

This is our latest addition to our PET portfolio and it provides high shear strain and it has been designed to meet blade designs in an optimal matter. PY105 is typically used in should-tip areas of the blades and PY250 in the root section of blades, again, as a alternative to balsa.

PVC FOAMS

The unique composition of our PVC foams yields impressive mechanical performance to a very low weight, which coupled with impressive resin uptake properties, provides a highly efficient combination of properties

Divinycell H

Divinycell H provides excellent mechanical properties and low weight. It has a proven track record in virtually every application area where sandwich composites are employed. It is compatible with most wet resin and infusion systems. It has been (and still is) one of the original core materials used in wind blades (and nacelles). It is typically used in the shoulder to tip section of a wind blade.

Divinycell Matrix 10-8

Similar in density to H60, Divinycell Matrix 10-8 is an enhanced grade with high strength-to-weight ratio and improved temperature performance during the composite curing process, providing an extra degree of security when curing with faster and higher exotherm resin systems. The unique PVC formulation yields impressive mechanical performance to a low weight. High mechanical properties at lower weight bring many crucial benefits.Like Divinycell H60, it is typically used in the shoulder to tip section of a wind blade.

Divinycell HP

Divinycell HP is developed to meet demands in high temperature systems and low temperature prepreg systems. It features high strength and stiffness to weight ratio, even when exposed to high ambient temperatures. It also has excellent chemical resistance, low water absorption and good thermal/acoustic insulating properties. It has been (and still is) one of the original core materials used in prepreg wind blades. It is typically used in the shoulder to tip section of a wind blade.

BALSA

Balsa materials are particularly easy to work using conventional woodworking tools. They can be drilled, milled, turned and sawn to close tolerances.

Probalsa

ProBalsa is a high-quality organic core material made from end grain balsa wood and is available in several densities, most typically 150 kg/m^3. Featuring exceptional compressive strength, it is used in a wide range of applications and can also be combined with PET and PVC core materials in wind blades. ProBalsa is compatible with most resin and manufacturing processes and suitable for elevated temperature cure systems. It has traditionally been used in the root sections of a blade due to its properties, but has increasingly been replaced by PET foams in new blade designs.

RESOURCES TO ENHANCE YOUR PRODUCT

Alongside the broadest range of core materials, we also offer you a comprehensive array of added value products, such as kits with pre-cut parts and surface finishing options for form and flow.

WITH THE OPTIMAL FINISHING YOU CAN GET A COMPETITIVE EDGE

The right combination of core material, laminate and finishing affect performance and quality of the final product. Finishing refers to the machining of structural core materials. You can choose from a wide range of cuts, grooves and perforations in different variations each serving a specific purpose for the core to adapt to curvature, or for air evacuation & resin distribution in vacuum assisted manufacturing process. With our long experience in composite design and manufacturing methods, we can recommend the finishing suitable for each purpose.

OUR FINISHING OPTIONS:

Flow
To evacuate air and distribute resin in vacuum assisted processes requires perforations and/or grooves in the core surface.
Proper design of the flow finishing will ensure good wetout of laminate and proper core bonding. Grooved and perforated cores can also remove the need for an additional distribution medium.

Form
Formable finishing options enable the core to conform easily to the surface in complex mould shapes. A number of form finishes are available both with and without scrim backing, and with either one or two direction cuts in the core.

Flow & Form
A combination of both of the above, used where the core needs to adapt to the shape of the mould and also has to distribute the resin as part of the production process.

KITS TO BOOST YOUR PERFORMANCE

A kit consists of pre-cut parts that are shaped as necessary and then numbered to fit exactly into their designated places in the mould. By eliminating the on-site shaping and cutting of sheets, you can reduce build times, save labour and material costs, and reduce waste. Easy assembly and exact fit in the mould mean you can consistently achieve a high quality in less time.
The kit can consist of everything from flat sheets to precise 3D shapes made with CNC routing. The design is based on your requirements for component weight, cost and quality level, as well as the geometry and manufacturing process selected.

OUR KITTING OPTIONS

Industrial kitting
High quality kitting that meets your needs for speed and efficiency. We use a well- defined kit process that enables us to provide the most competitive offering, top service, and quick turn-around times. Depending on the requirement, we can choose from multiple solutions to optimize weight or cost.

Advanced kitting
Diab's innovative advanced kits offer optimized fit in the mould, reduced resin consumption, and improved laminate surface finish. Combining Diab knowledge of kits and infusion and by creating custom software specifically for the task, we can optimize the cuts required in the core to allow it to perfectly fit the local curvature of your mould, while minimizing resin uptake.

KNOWLEDGE THAT OPTIMIZES YOUR SOLUTION

MAKE THE MOST OF YOUR APPLICATION WITH OUR EXPERTISE
Diab Application Center is our powerful team with engineers, product specialists, and process specialists ready to team up with you to realize the total value of composites.

PRODUCT SUPPORT
We are here to support you with selecting the suitable core material for your application, advice on finishing the best fit for purpose, and essential advice on different manufacturing processes. Product support always comes for free with the purchase of our products.

COMPOSITE CONSULTING GROUP (CCG)
Our experience in sandwich core materials and related manufacturing processes is well documented. CCG provides specialized composite technology and engineering services to improve your product further. With broad competence within everything from design and structural engineering to process optimization – including flow modeling for closed molding, tooling design, and infusion training – we ensure that you can realize the total value of composite designs.

KIT ENGINEERING AND PRODUCTION
Diab uses a well-defined kit process that enables us to provide the most competitive offering, top service, and quick turn-around times. Whether the kit consists of flat sheets or 3D machined parts, we look at surface requirements, tolerances, weight limitations, and it all affect the approach we take for each kit design.

COMPOSITE PART & PROTOTYPE PRODUCTION
Prototyping and short production runs have high investment costs and can limit other daily operational activities. Our experienced engineers and fabricators can quickly bring your concepts to reality, whether you are in a start-up or existing business with a lack of resources or equipment.

TESTING
Understanding the material and its behavior in a variety of environmental conditions is key to optimized design. Let us help you characterize your composite solution, core materials, and sandwich structures with our own calibrated testing equipment and network of authorized test labs for exotic test methods.

APPLICATION AREAS TYPICAL IN WIND BLADE AND NACELLES

The blade is considered a key technological component of a wind turbine generator (WTG) as its design, and how it captures the wind, significantly contributes to the effectiveness of the overall WTG. Nacelles are either structural or non-structural, but in either case they provide an aerodynamic lightweight cover and in the former case, also structural properties, while the spinner provides an aerodynamic lightweight cover.

CORE MATERIAL SIGNIFICANTLY BOOST EFFECTIVENESS

Blades made of core materials significantly contribute to the effectiveness of wind turbine generators. PVC and balsa have been the original design materials, with PET more recently and now firmly established is a third option. Due to the design flexibility available, blade bom's (bill of materials), can feature 1, 2 or all 3 material types. Typically, designers will use higher density (e.g., Probalsa 150, PN200, PY250) and lower density (H60, H80, PY105, PN115) grades in various areas of the blade shell and spar/web.

As a building block, Diab offers the designer PET and PVC grades in various densities, as well as balsa.

CORE MATERIALS ARE IDEAL FOR NACELLE ROOFS, FLOORS, AND WALLS

Core materials with excellent strength-to-weight ratio are ideal for nacelle roofs, floors, and walls. Whilst there are some structural nacelle designs demanding structural properties and using some of the grades used to build blades, most designs are non-structural. In this case, the designer, OEM and nacelle builder is building a housing to cover the generator and from the weather and looks for the lowest-cost solution. Typically, low density PVC (H45, H60) and PET (PN65, PY80) are used.

As a building block, Diab offers the designer PET and PVC grades in various densities. As with blades, as well as providing design properties, the core is also used as a processing aid during the nacelle infusion process, which is the primary technology used today.

DIAB AT A GLANCE

- SALES UNITS
- DIAB'S MANUFACTURING PLANTS
- MANUFACTURING PARTNER
- HEAD OFFICE

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COWORKERS

WORLDWIDE SUPPLY AND SUPPORT
Ensuring security of supply, cost efficiency, flexibility, and local support, Diab combines a global manufacturing, sales, and engineering presence with local know-how. We follow our customers and anticipate their needs, positioning ourselves in locations to best support them. Our seven manufacturing sites and fourteen sales companies in strategic locations around the world offer our full range of materials and services.

FOUNDED 1950 IN SWEDEN

8
MANUFACTURING SITES

14
SALES COMPANIES

40
DISTRIBUTORS

OUR FOCUS AREAS:

WIND

MARINE

INDUSTRY

AEROSPACE

Take advantage of our knowledge!
At www.diabgroup.com you can get exclusive access to our expertise via MyDiab. And with our interactive Core Selection Guide it's easy to find the best core for your application.

Member of UN Global Compact
Approved CO_2-reduction targets from the Science Based Targets Initiative

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Diab is a world leader in sandwich composite solutions that make customers' products stronger, lighter and smarter. Diab provides a range of core materials, cost-effective kits and finishings, along with in-depth knowledge on composites. Diab also provides engineering services for composite technology through Composites Consulting Group (CCG). Diab is a participant in the UN Global Compact.

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