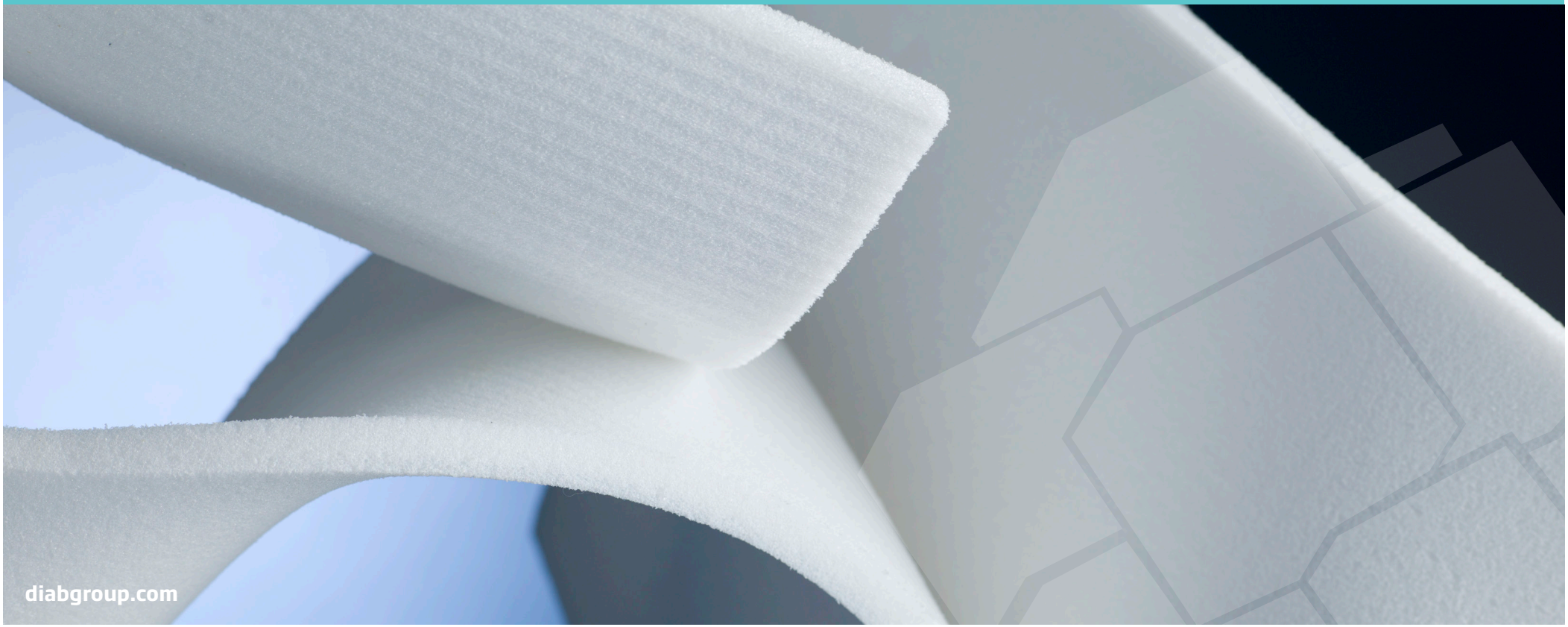
Diab

CORE SELECTION AND 8 STEPS TO A SUCCESSFUL SANDWICH APPLICATION



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8 STEPS

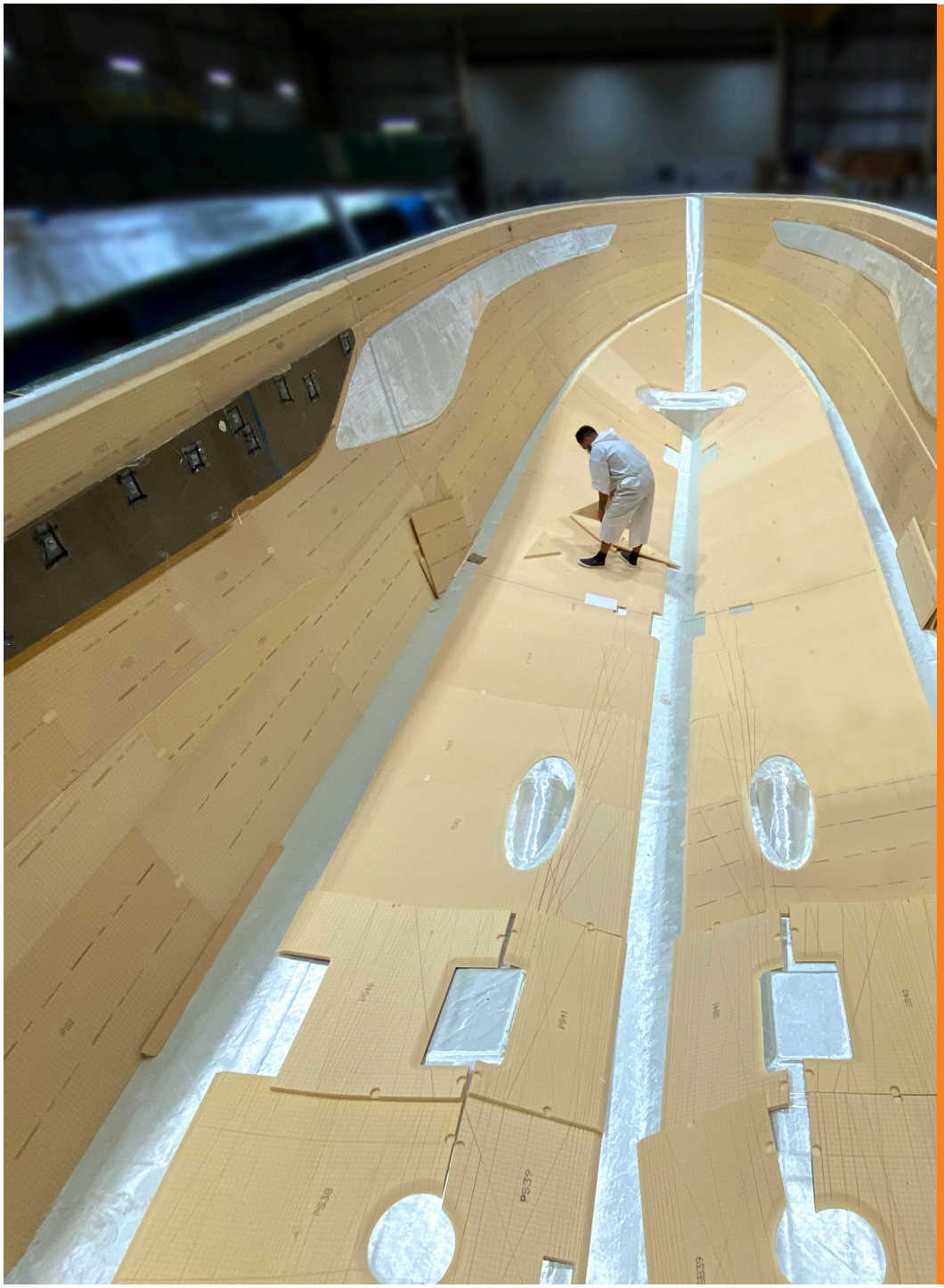
To get the most out of your product, you should choose the core materials that will best suit the needs of your applications. This 8-step-guide describes the steps towards a successful sandwich application, including selecting a suitable core. For more in-depth information about which specific core materials are ideal for your applications, you can use the Core Selection Guide at diabgroup.com. Or get in contact with our experts.

1 WHAT TYPE OF PERFORMANCE YOU WANT TO OPTIMIZE

Different core materials and grades match different needs in different types of applications. The first step in choosing the optimal core material is to define the desired performance of your application. For a speed boat, it could be to increase speed, reduce fuel cost and allow for a higher payload. For a car, it could be to lower fuel consumption and create better sound insulation. Core materials will also reduce the environmental impact, lower weight, increase strength, create more flexible designs, reduce the need for maintenance and lower thermal conductivity.

2 DEFINE WHAT TYPE OF REQUIREMENTS THE CORE MATERIAL MUST MEET

The next step is to define what requirements the core material must be able to meet. For an application within the aerospace industry, it could be to have the lowest weight, be recyclable, FST compliant and shaped into complex forms. For a navy vessel, it could be that the core material must provide excellent fatigue and slamming properties as well as be nonmagnetic.



3 CHOOSE THE MANUFACTURING METHOD

Different manufacturing methods have their pros and cons. It's essential to choose the one that best fits the application's requirements, including performance, quality, surface finishing and production volume.

Infusion offers consistent, repeatable quality, a cleaner working environment, and high-quality laminates with higher fibre content and excellent core bonding. In **wet lamination**, the resin is impregnated into the fibres by hand, using brushes or rollers. The result depends on the skills of the staff performing the lamination.

Prepregs are vacuum-bagged and then subjected to an increased temperature to cure the laminates. Advantages using prepreg includes ease of use, low void content, good fatigue resistance, control of laminate thickness, as well as good conformity and quality.

Most of Diab's core materials are compatible with the most used resins and manufacturing methods, including wet lamination, infusion, RTM and prepreg, as well as vacuum bagging and press bonding.

4 CHOOSE A SUITABLE TYPE OF CORE MATERIAL

A sandwich core is a material that is light, strong, and easily tailored to different processing and operational conditions. It 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. Diab provides a wide range of structural core materials for optimized sandwich design, and each grade offers specific characteristics suitable for various conditions.

PVC

Our series of high-performance PVC core materials with excellent strength-to-weight properties. An all-purpose series used in multiple industries and available in a wide density range suitable for different manufacturing processes, e.g. infusion and prepreg.

Divinycell H offers excellent mechanical properties and low weight. It is widely used and has a proven track record in virtually every application area employing sandwich composites, including wind, marine, industry, transport, and private jets. The PVC series comes in grades H, HP, HM, HT, and HCP with different features suitable for many applications, and each grade has a variety of densities.

Divinycell MC is the innovative next-generation structural core with best-in-class mechanical properties and low weight. The unique microcell structure renders substantial weight reduction of the laminate, thanks to lower core density combined with an exceptionally low level of resin uptake.

PET

Our series of thermoplastic, recyclable PET core materials are suitable for many applications and industries, such as wind energy, transport and construction. The PET series is available in different grades and densities, including a version with good Fire, Smoke & Toxicity (FST) properties. The PET series includes Divinycell P, with good mechanical and FST properties, making it ideal for public transportation and construction. Divinycell PN, a multipurpose grade suitable for many applications, including marine and Divinycell PY, a grade developed to optimize wind blade designs. The PET series is compatible with most resin systems and capable of high-temperature processing.

PES

Our recyclable PES-based sandwich core material, with excellent FST properties and high-temperature processing capabilities, is suitable for commercial aircraft's interiors. Divinycell F is a core material series developed explicitly for aircraft interiors, seating and food trays. It improves lifetime costs while decreasing environmental impact. It has excellent FST properties and meets the US and European regulatory requirements for commercial aircraft interiors. Available in many different densities.

BALSA

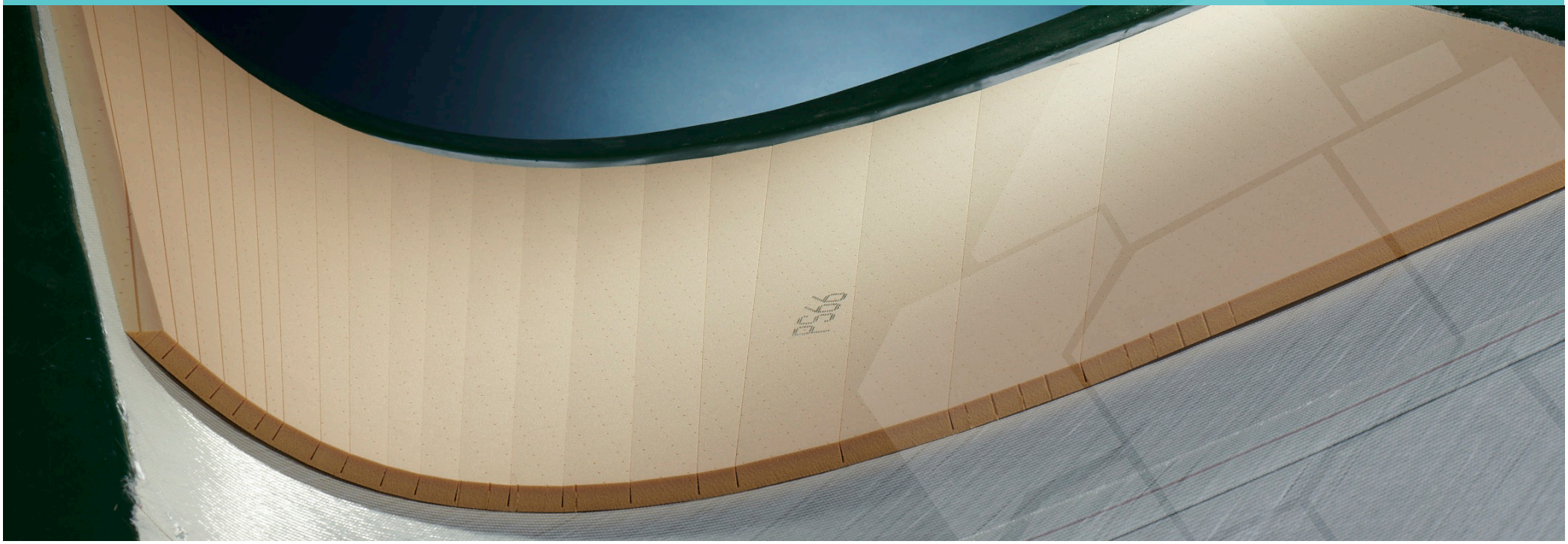
Our high-quality organic core material is made from end-grain balsa wood. It has high compressive strength and is used in a wide range of applications, and is often combined with foam core materials in, for instance, wind blades. ProBalsa is compatible with most resin systems and manufacturing processes, and it is also suitable for elevated temperature cure systems.

5 TAKE YOUR TIME OPTIMIZING THE DESIGN

Composite materials offer nearly unlimited design freedom, allowing exploration of innovative design concepts, such as free form shapes and monocoque structures. They also provide novel approaches to structural engineering, which can dramatically increase product development value. With in-depth knowledge of the performance requirements of composite products, like their structural, thermal, fire or cosmetic performance, you can create a design that balances structural efficiency with ease of manufacturing and cost conciderations. Further optimisation can be done by Finite Element Analysis (FEA), static, non-linear, dynamic response and fatigue studies, and ply-by-ply failure prediction.

6 TOOLS AND PROTOTYPING

Moulds for fabricating composite structures are critical to their ultimate quality. The moulds and tools must be adequately designed to withstand the sometimes harsh environment of the moulding process to ensure part quality and long-term production. In most cases, the moulds for fabricating composite structures are composite structures in their own right. We recommend that you use a tooling design service that can assist you in implementing the production of composite parts – everything from creating master patterns to mould construction, break-in and making the first prototypes at on-site facilities.



7 TESTING TO SECURE PERFORMANCE

Understanding the material and its behaviour in various environmental conditions is key to optimized design. Design and engineering are only as good as the input data, and composite material properties are not readily available in a handbook. You must consider composite material properties, including analytical, mechanical, fire, process, thermal and acoustic. We recommend using both internal test equipment and third-party laboratories to test compression, tension, shear, flex, peel, resin content, and impact.

8 PROCESS EFFICIENT MANUFACTURING

Completing the design on paper or on the computer is only one step in getting your products to the market. Efficient manufacturing is necessary to maintain a competitive edge. You must manage projects and resources, develop manufacturing strategy, material requirements, work instructions and factory setup for your specific needs. That includes developing, training, and implementing composite manufacturing processes for specific composite parts or an entire factory based on standard composite manufacturing methods.

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Are you interested in getting the optimal sandwich core for your application? Contact one of our sandwich composite core experts or visit diabgroup.com