Diab

AT THE CORE OF YOUR PERFORMANCE

KITTING

diabgroup.com

OPTIMIZE EFFICIENCY, COST, WEIGHT, AND QUALITY WITH DIAB KITTING SOLUTIONS

WHAT IS A KIT?

A Diab kit is a tailor-shaped set of core elements. The kit can consist of simple pre-cut core panels or complex 3D shapes made with CNC routing. Each piece is pre-cut and then numbered to fit precisely into its designated place in the mould. Kits are designed based on your application's requirements for weight, cost, and quality. Our kit engineers take geometry and your manufacturing process into account when designing each kit. A kit drawing is supplied with each kit to define the assembly lay-up in the mould.

WHY A KIT?

You can significantly streamline the manufacturing process and improve the quality of composite applications with pre-cut parts (kits). By eliminating the on-site cutting of sheets, you can reduce manufacturing time and save labour and material costs. In addition, with the easy assembly and exact fit, you can constantly achieve high quality in less time.

- Boost performance in terms of weight, cost, and quality
- Shorten lay-up time of the core in the mould
- Decrease moulded weight with improved surface quality.
- Reduce finishing work on laminate
- Minimize the amount of waste handling
- Simplify internal logistics and reduce stock items
- Recover factory space

WHY A KIT FROM DIAB?

Diab is a world-leading supplier of sandwich composite solutions with long experience in developing kits. With deep technical knowledge in most manufacturing methods for composites, we understand what criteria are essential for the core kit to fit for purpose. We select the most appropriate from our wide selection of finishes for form or flow based on the requirements.
We design and produce our kits in-house, and we provide a direct connection between our engineering department and yours. Our experts are often on-site to discuss directly with you, take measurements, and note potential variations during the kit development phase. Together, we find the optimal solution.

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AN OPTIMIZED KIT FOR EVERY TYPE OF MANUFACTURING PROCESS

Together with the expected performance of the end product, it is crucial to analyze the manufacturing process used.

COMPOSITE MANUFACTURING PROCESS

The manufacturing process defines what finishing for form and flow we will use for the core going into the kits and which kit option we decide to use. The manufacturing process also influences how vital tolerances are when joining the kit details in the mould.

- Wet lamination. With this method, weight is usually not the most critical factor. Tolerances on the kit parts are generally less crucial compared to other processes.
- Vacuum Infusion. Core finishing selection for proper resin distribution is vital. The kit parts must fit well to reduce the risk of "race tracks" and print through from resin-rich gaps between core details.
- Resin Transfer Molding (RTM) includes two stiff counter moulds. It is essential to have a perfect match between core and mould to ensure laminate quality.
- Prepreg. Used for weight critical components with thin carbon laminates, demanding a perfect kit fit with high tolerances and minimum gaps between core details. Also, prepreg manufacturing may influence the choice of core grade.

GEOMETRY

The complexity of the component and the curvature of the mould influence which core finishing selection fits best into the mould shape with a minimum of spring back and reduced resin consumption. Full sandwich core coverage or allowing selected single skin areas will also influence the total cost of the kit.

STANDARD OR ADVANCED KIT

Discussions early in the kit design phase will help ensure it meets all requirements and expectations from performance, geometry, and manufacturing process. Based on this, our kit and production engineers decide what kit option will be best for each case.

Standard kitting is a good choice if your acceptable tolerances on the kit are higher and component weight isn't supercritical.

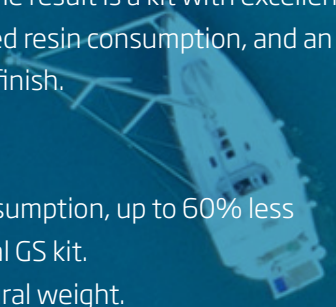
Advanced kitting is the optimal solution where lightweight, low resin usage, and highest surface finishing are crucial. Utilizing only ISCC PLUS-certified fossil-free PVC raw material in our advanced kits contributes even further to a smaller carbon footprint.

ADVANCED KITTING FOR MAXIMUM WEIGHT-SAVING, PERFORMANCE, AND CO_2 REDUCTION

Diab innovative Advanced kits offer a lower weight, an optimized fit in the mould, reduced resin consumption, improved fit and handling performance, and improved cosmetics for infusion and prepreg applications. Combining Diab's extensive knowledge of kits and composite manufacturing with custom software created explicitly for the task, we can optimize the curvature cuts required in the core to perfectly fit the local curvature of your mould while minimizing the resin usage.

Through a CNC proprietary cut profile for each kit detail, the core is cut part way through its thickness, eliminating the need for a scrim backing, leaving a smooth surface and curvature on the mould side.

Perforations and grooves can be added to the core surface to distribute resin without the need for a flow mesh. The result is a kit with excellent formability, reduced resin consumption, and an improved surface finish.



BENEFITS

- Lower resin consumption, up to 60% less than a traditional GS kit.
- Reduced structural weight.
- Improved surface quality due to an intact foam layer without GS scrim closest to the mould side fibre reinforcement.
- Improved fit in the mould. Each core detail is CNC machined for high accuracy and repeatability, and can be designed to have zero spring back.
- Varying bevels can easily be implemented.
- Improved quality and consistency of infusion (reduced risk of race-tracks when infusing).
- Allowing larger foam details will speed up the lay-up procedure.
- Repeatability between kits.
- Simple to incorporate add-ons into the foam kit for better positioning such as laser tracking lines or Kit-Locks.
- Kit-Locks enable easier positioning in the mould and ensures every panel is tightly joined, eliminating the need of hot melt glue.
- Due to the improved fit in the mould, reduced number of grids, and minimal gaps between details, the high laminate quality achieved dramatically reduces the need for post-grinding and finishing work, reducing cost.
- The Diab developed program to determine optimum grid directions in each detail allows the total resin usage for the core kit to be calculated and compared to other kit designs.

Advanced kitting is the optimal solution where weight, resin usage, and surface finishing are critical. Sailing boats, powerboats, yachts, simulators, antennas, aerospace applications, etc., are excellent examples of where you can utilize the benefits of Advanced kits to the best effect.

TECHNICAL INFORMATION

- Every core detail is individually CNC cut, and each cut is orientated to generate the desired curvature of the component.
- The core is not cut all the way through its thickness, leaving a smooth mould side core surface.
- Perforations or/and resin distribution grooves can be added depending on the manufacturing method selected. Several options are available.

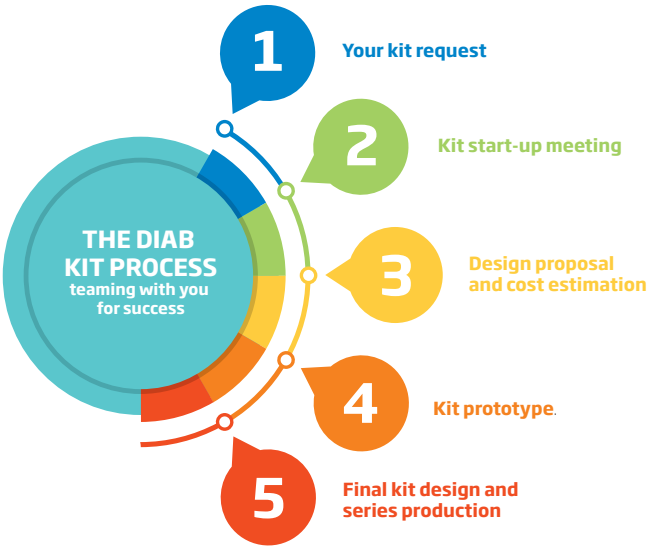
CERTIFIED FOSSIL-FREE PVC

By utilizing ISCC PLUS mass balanced fossil-free PVC (raw material) and producing the foam with 100% renewable energy, Advanced kits contribute even further to a smaller carbon footprint.

The ISCC PLUS certification guarantees full traceability throughout the mass balanced material supply chain to the finished kit at Diab's processing unit, including a sustainability declaration upon delivery. All new Advanced kits will include an estimated GWP (Global Warming Potential)/carbon footprint value for each kit.

THE DIAB KIT PROCESS– TEAMING UP WITH YOU FOR SUCCESS

Our Sales team and Application Center will work together with you all the way.



PREPARATION & BASIS

- Spend some time thinking about the critical success factors for your application.
- Specify the core thicknesses and core properties from the structural design. Diab can also assist with structural engineering.
- A 3D model or detailed 2D drawings, along with notes, are usually enough to start the kit design process. Ideally, you provide a core drawing or mould offset for cores, bevel placement, and angles. If this is not possible, we can assist you.

KIT START-UP MEETING

Together with you, we will go through the factors for success, including:

- Process selection.
- Geometry and core coverage, including bevels.
- Core Finishing selection.
- Tolerances required.
- Kit lay-up scheme, incl. preferred starting point.
- Packaging instructions.
- Supply frequency - Number of kits per delivery.

Depending on your requirements, we will recommend an Standard or Advanced Kit. Paying close attention to your needs early in the project significantly decreases the number of potential changes, which will save both time and money.

DESIGN PROPOSAL AND COST ESTIMATION

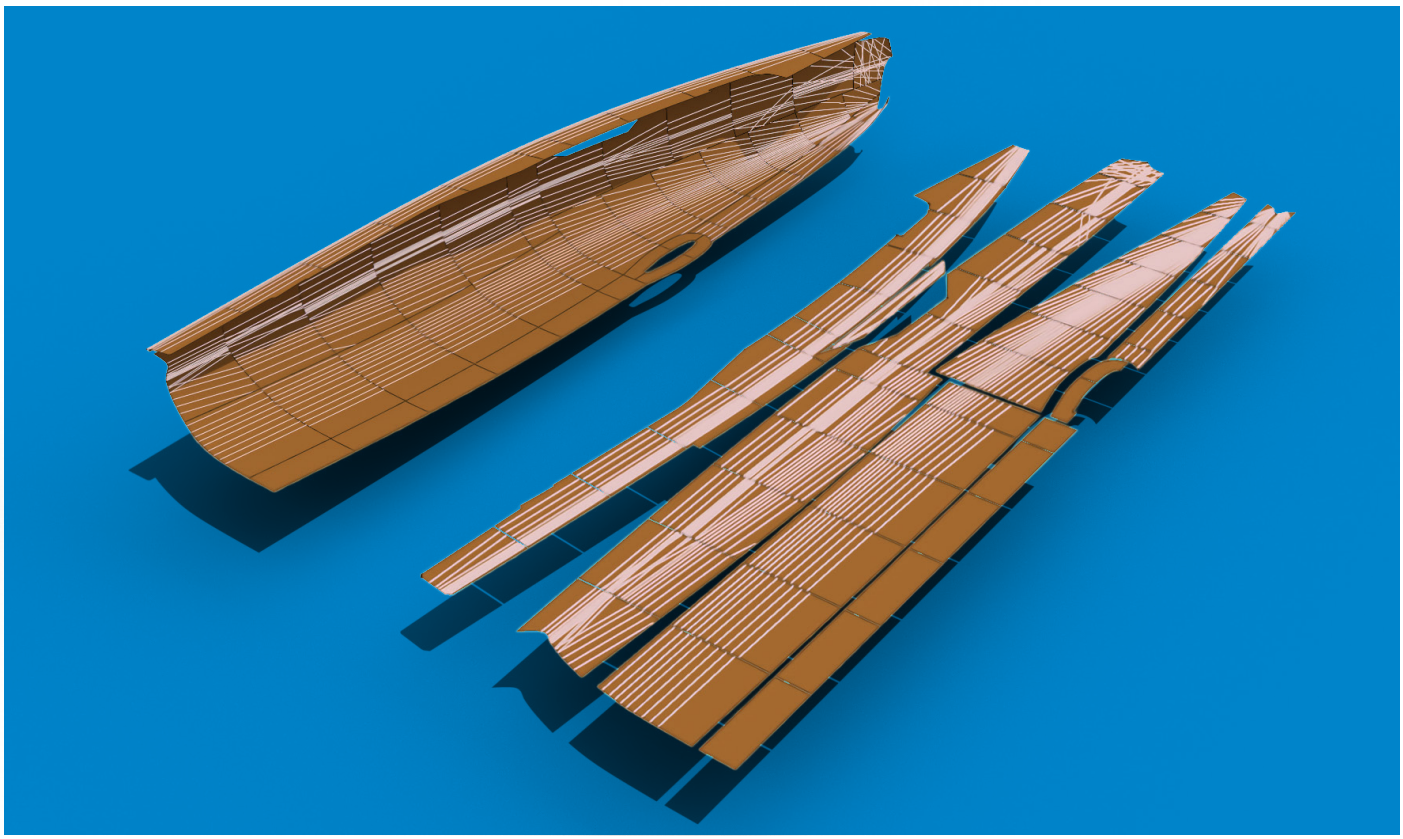
After the start-up meeting, we will work on and offer the kit design proposal. The Advanced kit proposal can include resin usage and saving comparisons depending on which type of kit design you choose. You will get a quote for the kit, and if it is accepted and all details (such as core to single skin transitions, bevels, finishing, grades, and thickness) are approved, we will produce a prototype kit for delivery.

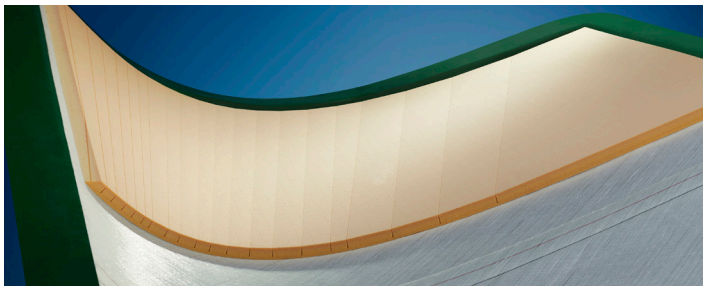
KIT PROTOTYPE

Depending on the complexity of the prototype kit, a representative from Diab can be present when you fit it to identify potential changes and improvements. We will then alter the design if necessary to minimize corrections on subsequent kits.

FINAL KIT DESIGN AND SERIES PRODUCTION

After making the potential corrections, we start the series production of the kit. If there are later changes in the design, they will be implemented in discussions with our Sales and Kit Team.





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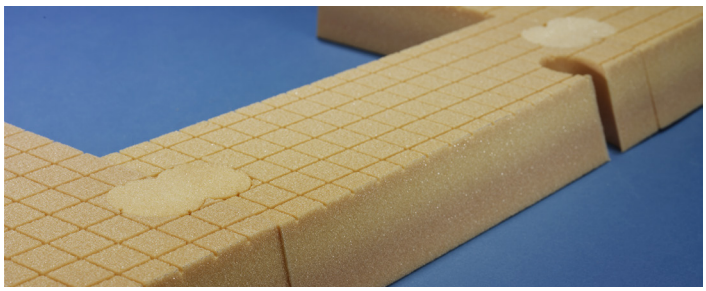
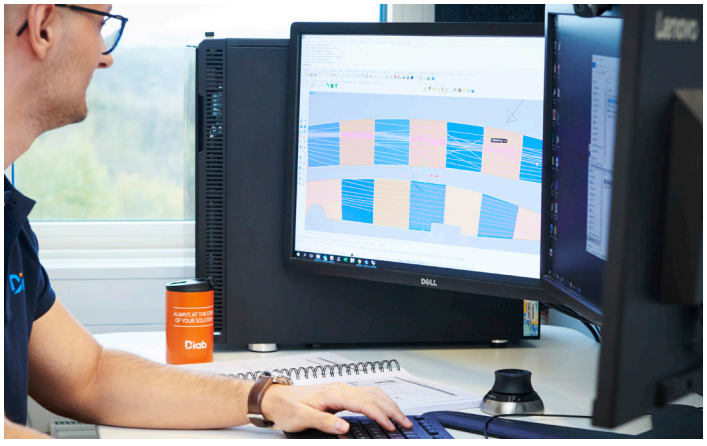
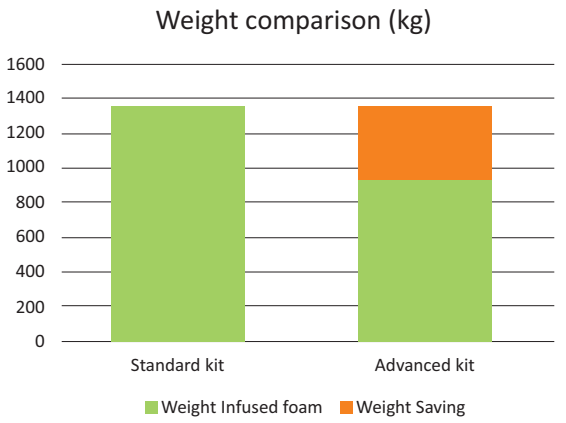


Kit-Lock





Advanced kits offer substantial resin uptake reductions compared to standard kits. The reduction in resin tied up by the core material and finishing will, in turn, result in a reduced carbon footprint.

For example, replacing a standard kit in an infused 80-ft sailboat hull with an advanced kit would save 419 kg of resin and reduce the carbon footprint by 1,677 kg CO_2 equivalent, assuming the resin's GWP value is 4.0 kgCO_2/kg.

DIAB APPLICATION CENTER

Realising the total value of composite designs

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. Diab Application Center also creates the kit designs in close cooperation with our kit production.

PRODUCT SUPPORT

We are here to support you with selecting the suitable core material for your application, advice on the best fit for purpose finishing, 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 modelling for closed moulding, tooling design, and infusion training – we ensure that you can realize the total value of composite designs.

CCG consists of mechanical and process engineers, material scientists, naval architects, and composite technicians with many years of experience from various industries. Our process consultants routinely work on applications using hand lay-up, vacuum infusion, RTM and RTM Light, prepregs, pultrusion, and filament winding, among others.

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 affects the approach we take for each kit design. Another essential part of the kit process is cost. With a correct understanding of your requirements, you will receive a solution optimized for your needs. Producing an Advanced Kit or an Standard Kit, we are well equipped to manufacture the most efficient way to optimize quality and cost.

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 a start-up or an existing business lacking resources or equipment.

TESTING

Understanding the material and its behaviour 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. Beyond material testing, we can help with a proof of concept, material characterization, and many field tests that require real-world applications.

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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.