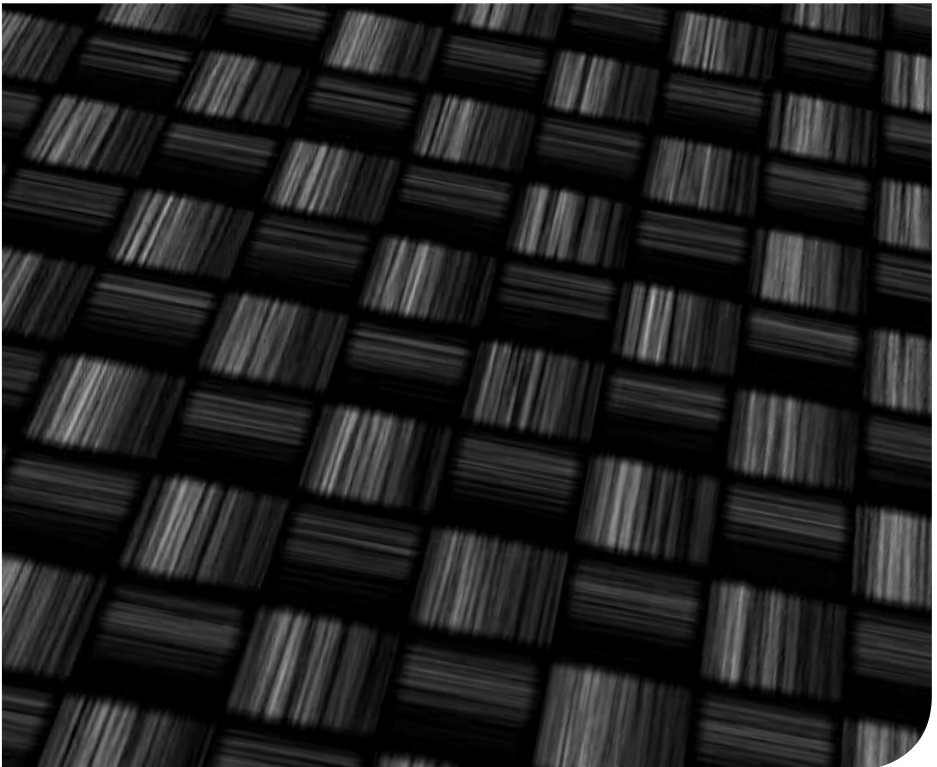




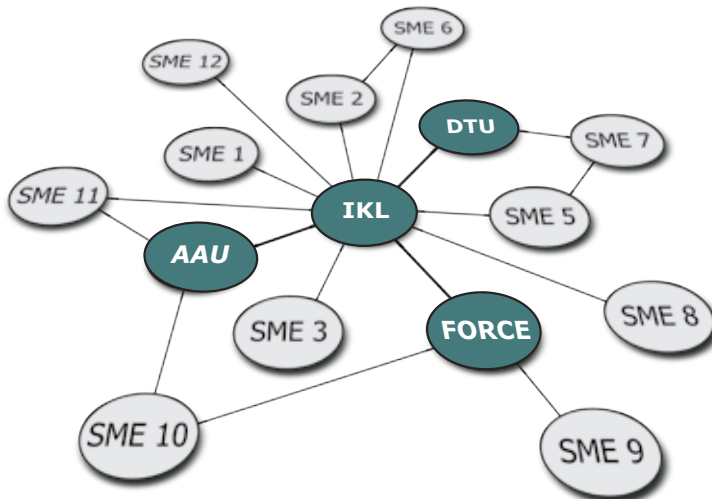
## The Industry's Composite Laboratory



# New applications of composite materials for industrial products

The Industry's Composite Laboratory (IKL) is an exciting new partnership between FORCE Technology, The Technical University of Denmark, and Aalborg University, that will assist companies in developing the knowledge and competences required to substitute the traditional materials used in their products, such as metal and concrete, with composite materials.

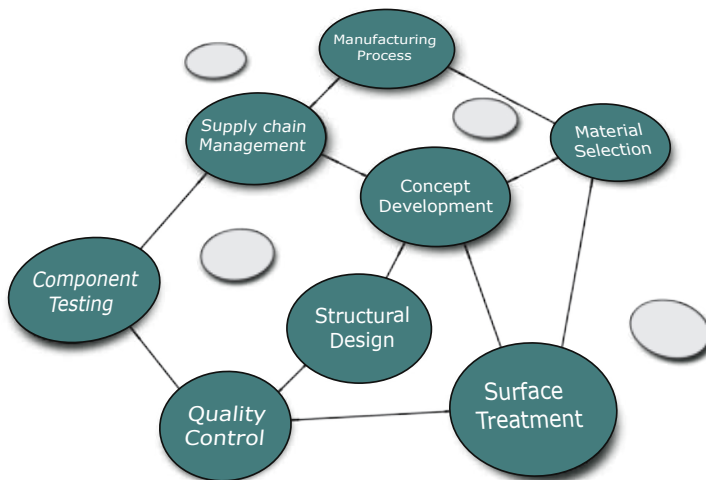
IKL is lead by FORCE Technology – an Advanced Technology Group (GTS) - and is actively supported by the Ministry of Science, Innovation and Higher Education.



“The Industry’s Composite Laboratory has great potential. The partners listed in the project have extensive technical knowledge, and it would be very beneficial for Danish companies to have help from these specialists in solving a problem – both theoretically and experimentally”.

Michael Yde Nielsen - Scanfiber Composites A/S.

During the 3 years of collaboration, IKL will take selected small- and medium-sized enterprises (SMEs) through an innovation and learning process where they will acquire the skills needed to take the first step into the world of composites. Companies will be introduced to a composites oriented production process, which aims to provide all of the development and process steps, i.e. design & concept development, material selection, calculation models, manufacturing, and quality control. The process is carried out in close collaboration with FORCE Technology's specialists and will make use of the IKL partners design, production and test facilities.



"As a SME within the composite industry, I can confirm that cooperation of this type is very essential for success, as small companies like us cannot carry alone the burden of testing and documentation along with material and product development work."

Tim Hansen - House of Composites.

# Why composite materials?

Fibre-reinforced polymer-materials (FRP) have many advantages in comparison to traditional construction materials. Most notably:



## Low weight

Composite materials are incredibly light compared to concrete, steel and wood. A composite construction can often weigh 25-75% less compared to a steel construction of the same strength. That means for example, that aircraft, trains and cars fabricated with composite materials can be made more fuel efficient – resulting in lower operating costs.

## High specific stiffness and strength

FRP materials have excellent elastic properties and high strength per unit weight. The specific stiffness and strength of unidirectional fibre composites are often 5-10 times higher than in conventional materials. For example, carbon fibres are used for a bicycle frames and automotive suspension arms. Aramid fabrics are used for bicycle frames and suspension components in cars.

## Good chemical and corrosion resistance

Composite materials are highly resistant to chemicals. Rust and corrosion resistance is one of the reasons why the maritime industry was one of the first to use fibreglass composites.

## Other advantages

Composite materials can be designed so that they are electrically insulating, have low thermal expansion or have tailor-made physical and mechanical properties, such as good fatigue properties. Finally, they can be produced in complicated shapes, for example optimal aerodynamic profiles for wind turbine blades.

# What The Industry's Composite Laboratory can offer you

FORCE Technology has a variety of advanced measurement techniques, material characterization, and testing facilities. This provides great versatility when products must be tested and properly documented.

## Material selection

In order to achieve the desired properties of a product, it is important to be critical in the choice of materials. FORCE Technology's composite and polymer specialists have extensive experience in material selection and preparation of requirement specifications.

## Structural design

Ensuring that the product can last the expected lifetime of operation, while also reducing the amount of material used in the construction, is often the key to a successful design. The IKL partners have experience with advanced design and analysis techniques, such as CAD software and finite element analysis, and can simulate how the product will perform under static and dynamic loading conditions.

## Manufacturing processes

Composite products can be manufactured in a number of ways, and part complexity, choices of material, and production volumes need to be considered in order to determine the most cost-effective production method. The IKL partners along with material suppliers and manufacturing experts will determine the production process that is best suited for the component being produced.

## Mechanical testing

FORCE Technology's engineers perform tensile, compressive, and shear testing, as well as 3- and 4-point accredited bend testing on plastic and composite specimens.

## Chemical and thermal analysis

FORCE Technology has a wide range of equipment for material analysis of plastics, rubber and composites. For example, for the determination of the chemical composition, moisture content, surface tension, fibre content, etc. Thermal analysis can be used to determine the melting temperature, degree of cure, glass transition temperature and composition.

## Ultrasound and X-ray analysis

FORCE Technology's analysis experts reveal internal defects and damage in composite materials which are not yet visible from the outside. For example, FORCE develops advanced measuring equipment for the testing of wind turbine blades worldwide.

## Participate in workshops, seminars and courses

There will be an ongoing series of composite relevant courses and seminars, which in addition to presentations from FORCE Technology's specialists, there will be interesting presentations from leading university researchers, and specialists from the composites industry. The focus will be on materials, design, manufacturing processes and quality control.

### The companies contribution – what do we require from you?

In addition to general consulting services, IKL offers business aligned innovation and learning courses on favourable terms for selected businesses. There are however, some requirements that must be met, including that the company is preferably an SME and prepared to participate actively in the product development process. For further information about this opportunity contact FORCE Technology. See information on the back of the brochure.

Examples of projects related to composite materials:

- A company has a new exciting product in the pipeline. This is a support shaft made out of composites that can make truck trailers significantly lighter.
- A company wants to develop and sell new composite process equipment for the wind rotor blade industry. The desire is to have help with process optimization and quality assurance, which will make the equipment highly competitive.







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