

# A total system approach for hybrid systems

We aim to develop and improve solutions which are innovative, sustainable and of the highest quality which contribute to successful projects in the Marine & Industry.



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## Experience

Alewijnse has 130 years of experience in marine and industrial technology and undertakes projects around the world. As partner in systems integrator, the company supplies a comprehensive range of technical solutions, such as electrical installations, power distribution, generation and propulsion systems, process automation, audio video & IT and safety & security, navigation & communications.

## Expertise

We work on a great number of vessels and industrial installations every year in sectors that include Yachting, Naval & Governmental, Dredging & Offshore and Industry. This work includes contracts for new build, refit, repair and maintenance projects. In the Industry segment Alewijnse specialises in drinking water, food and specific projects in the manufacturing industry.

## Sustainability

In response to the ever-increasing need for sustainable operations, Alewijnse is at the forefront of designing environmentally friendly propulsion and energy-efficiency systems for maritime and industry. At its branches in the Netherlands, Romania, France and Vietnam, Alewijnse Marine has over 1,000 flexible and well-skilled employees, supporting clients all over the world, delivering Dutch quality and attention to detail demanded by yards and owners.

# Introduction



**As an independent electrical integrator with a long term experience in the maritime sector, at Alewijnse we offer hybrid propulsion and generation solutions based on our in-depth knowledge of the varied technologies involved and our freedom to source best-in-class components from the world's leading manufacturers.**

Rather than having off-the-shelf systems to sell, our approach is based on proactively exploring what our customers seek from their hybrid systems in terms of functionality, usability and performance. Only then do we start designing the systems that will best meet their needs in partnership with the owners' representatives, naval architects and the proposal & design engineers at the yards.

We offer a comprehensive service, working in partnership with our customers from the initial conceptual design and simulation stage, through basic and detailed design, procurement and production, to installation, commissioning and after-sales service.

As Alewijnse we understand just how complex hybrid systems are. We even have a formula for this;  $\text{Complexity} = (\text{Drive System})^2$ . We also appreciate that our clients require human machine interfaces that are highly intuitive. Our design methodology uses a modular format, with the core components for hybrid systems of all types essentially pre-designed using parts based on proven technologies supplied

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by our OEM's. We then apply our expertise in the design and production of the total electrical plant, automation, monitoring and control to create the integrated hybrid systems that best fulfil the performance and functionality objectives of our customers and their vessels. In particular, our automation system makes our systems easy to monitor and simple to operate with one-touch functionality via touchscreens.

Whatever we do, we always aim to be effective and to supply systems that are straightforward to use and deliver safety at every level, be it in the form of redundancy, reliability or the integration of carefully thought-out fall back modes in case of failures.

As such, as a global systems integrator we sit comfortably between the leading OEMs with their highly capable, off-the-shelf systems that may on occasion be less adaptable to the customers' needs than they would like, and local integrators who may not be able to manage the more complex projects.

### Key market sectors

We welcome enquiries from any ship owner or operator seeking hybrid propulsion and / or generation systems. The sectors in which we are seeing the most demand at the present time are governmental (coastguard, port authorities etc), naval non-combatants (support, minesweepers, submarine support etc), dredging, inland ferries and luxury yachts.

### What makes an Alewijnse hybrid system?

The definition of a hybrid is essentially something that is the result of combining two or more quite different elements to create something that has characteristics drawn from each of the sources. For hybrid propulsion this is generally seen as the bringing together of two different energy sources to provide thrust.

But for a maritime electrical integrator like Alewijnse, this is just the starting point. From our perspective a hybrid system can also be seen as the combining of multiple systems; propulsion of course; diesel and / or electrical motors, a DC supply system that can include the shore supply, batteries, diesel generators and PTO (power take-off). For these

to work seamlessly together requires well designed and proven modular building blocks together with sophisticated integration skills such as total plant simulation, and highly skilled personnel across a range of disciplines.

### Total System Solutions

At Alewijnse we offer what we call Total System Solutions. These are based on a complete range of core modules designed in-house using high quality, dependable components from preferred suppliers. Upgraded over time as enhanced parts become available, each one is a proven template for one of the many sub-systems that together make up a hybrid system. They are all specifically designed to be fully compatible with all the others to ensure easy inter-connection and inter-operability. We regard this as the 'Lego' approach where, despite the great range of options available, each unit can still be connected to any of the others.



This allows us to quickly and confidently establish the basic framework of a system when a customer comes to us with specific operational needs. With that in place as a solid and reliable platform we can then move on to the custom aspects that require integration expertise and bespoke solutions.

Combining the proven modular building blocks does bring new challenges, mainly regarding phenomena in the time domain. These generally relate to:

- The physical restrictions imposed by individual components (and therefore the modular building blocks)
- Dynamic capability of equipment requires proper matching in Power and Voltage requirements
- Common mode and Earth loops require a more model based and integral approach.
- The low potential energy stored in a DC system. This makes them vulnerable to drastic load changes. (To manage this simulation and fast controllers are mandatory)

To address these issues, we produce series of designs that we test using a combination of virtual, HIL and real plant simulations to determine the most effective solutions.

### Alewijnse solutions

To ensure that the integrated hybrid system operates smoothly and effectively Alewijnse has developed a drive control system (DCS) that is

a leader in its field. As well as being fully programmable to deliver exactly the functionality that the customer requires it also stands out for its ability to provide full control and monitoring from any one of multiple station as well as one-button transitions between plant where less sophisticated alternatives would require a sequence of actions. Other features include the full monitoring and control of all incoming users and consumers and full coordination of all other platform systems including the alarm monitoring system (AMS), propulsion control system (PCS) and power management system (PMS). We also offer energy management systems which will optimise an entire installation based on specified objectives and the Alewijnse DCS is additionally easily integrated with dredge automation systems for maximum efficiency and productivity.

### Track record

Since we entered the hybrid market we have worked on a wide variety of projects. This includes working with some of the world's leading superyacht yards including Amels, Holland Jachtbouw and Oceanco. The owners of these vessels demand the highest standards of sophistication, reliability and ease-of-use, and are often looking to set new standards of capability and innovation in the areas of low-emission and near-silent propulsion and power generation & storage. At the same time they expect their own, often highly complex, needs to be met.

Elsewhere we have also provided solutions to a series of Belgian minesweepers as well as working in the growing area of all-electric ferries.

 <b>130</b> Years of electrifying the world	 <b>2589</b> Projects executed for our customers	 <b>1,3</b> Times around the world with our cables	 <b>1.092.457</b> System engineered, installed and commissioned	 <b>53</b> Countries where we delivered our services
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Our goal is to co-create value with and for our customers and partners. We aim to develop and improve electrification and automation solutions which are innovative, sustainable and of the highest quality. We focus on making a valuable contribution to successful projects in the maritime and industrial sectors.

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