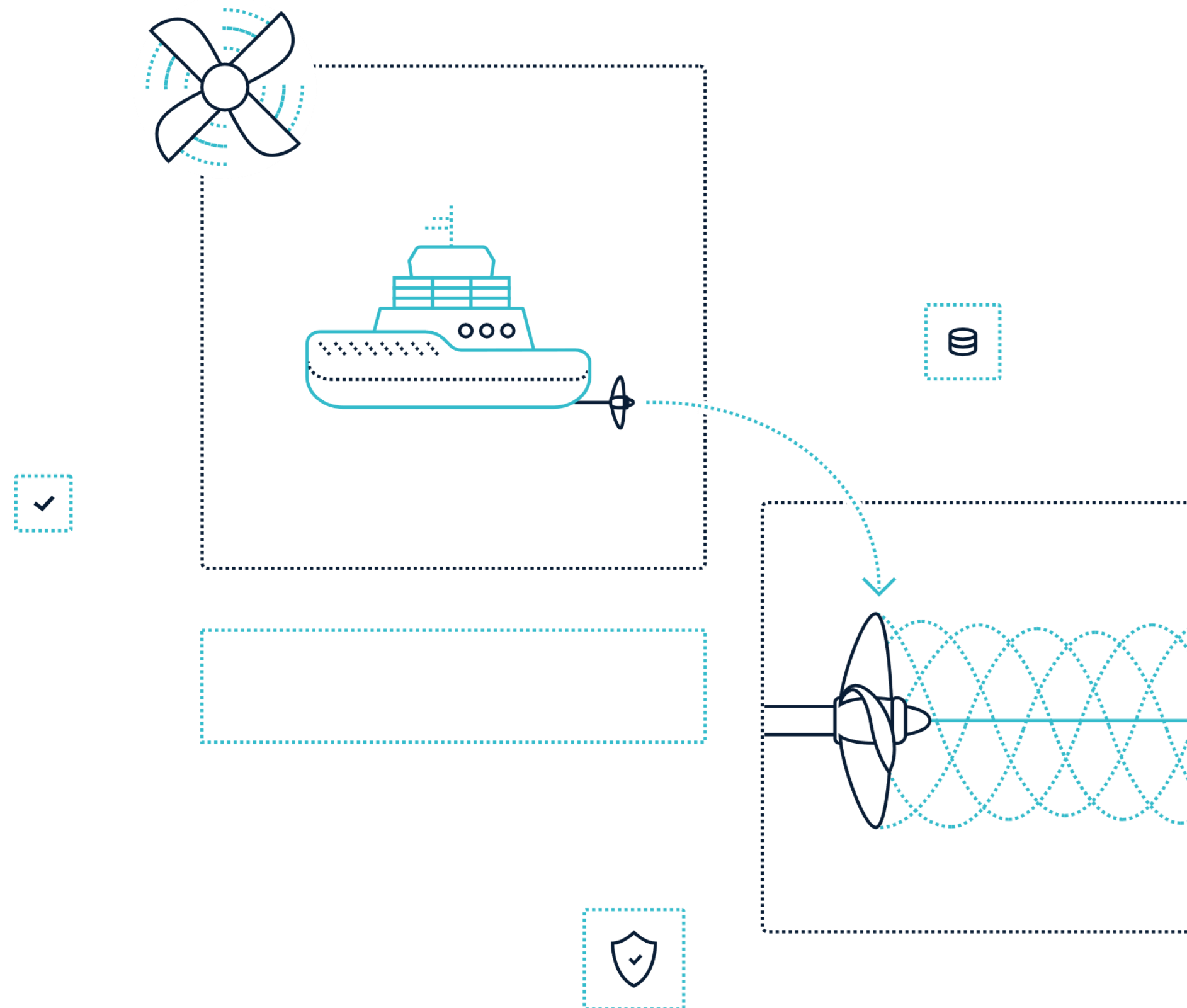


CASE STUDY

Smart Propeller: Electric ship propellers with additional functions

/ Smart Propeller: Suppression of cavitation

New USPs with VirtualSensor



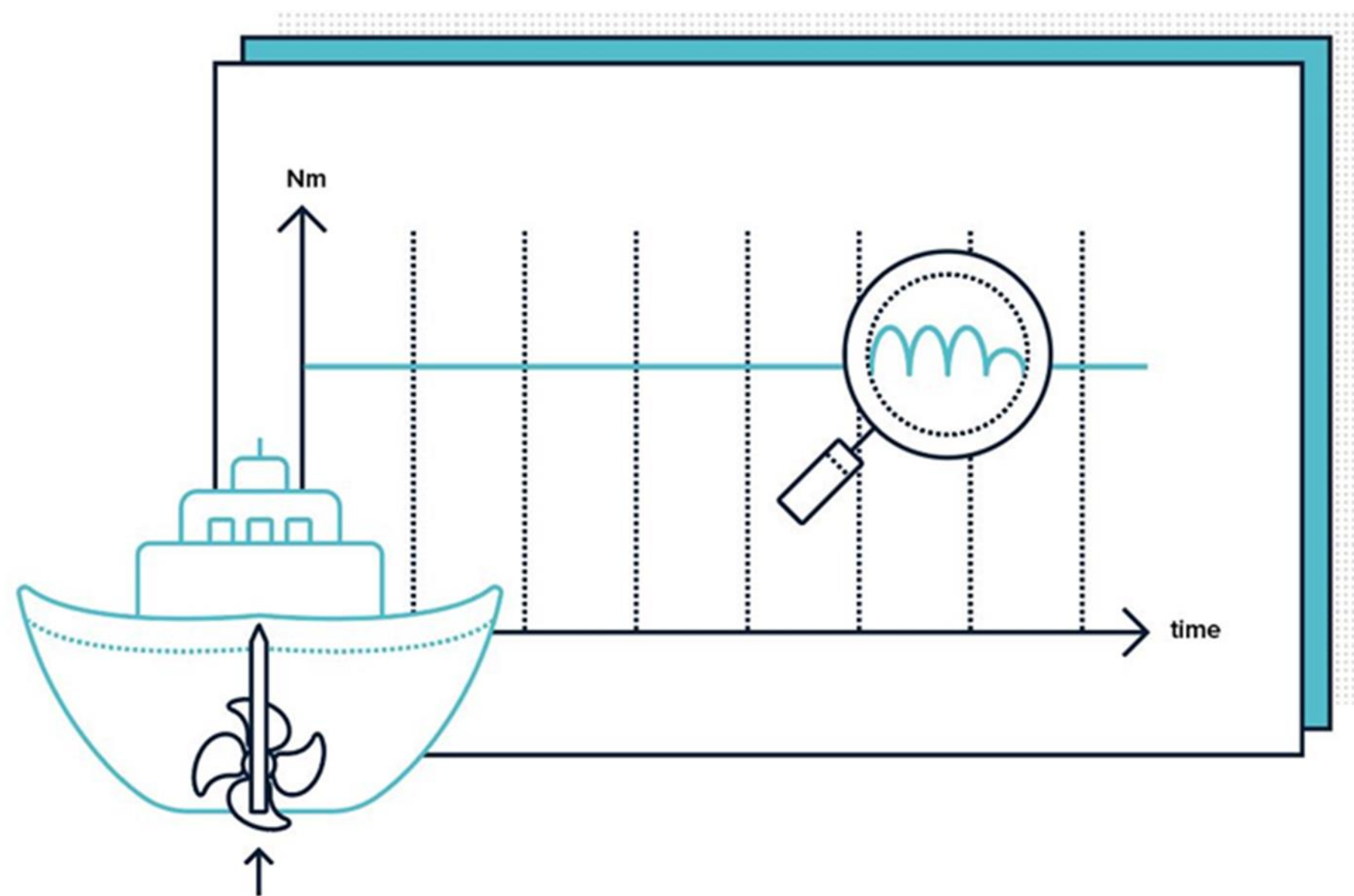
Cavitation and how to avoid it

Our **VirtualSensor** technology makes it possible to determine the torque of an electric ship's propeller in high resolution and in real time.

- The occurrence of cavitation leads to a lower torque.
- The occurrence of cavitation can be detected and prevented by a special modification of the otherwise constant speed.
- This leads to the following main advantages:
 - Greatly improved maneuverability and, in particular, shorter braking distances
 - Reduced energy consumption
 - Avoid damage to the propeller and the transmission mechanism.

/ Smart Propeller: Detection of blade damage

New USPs with VirtualSensor



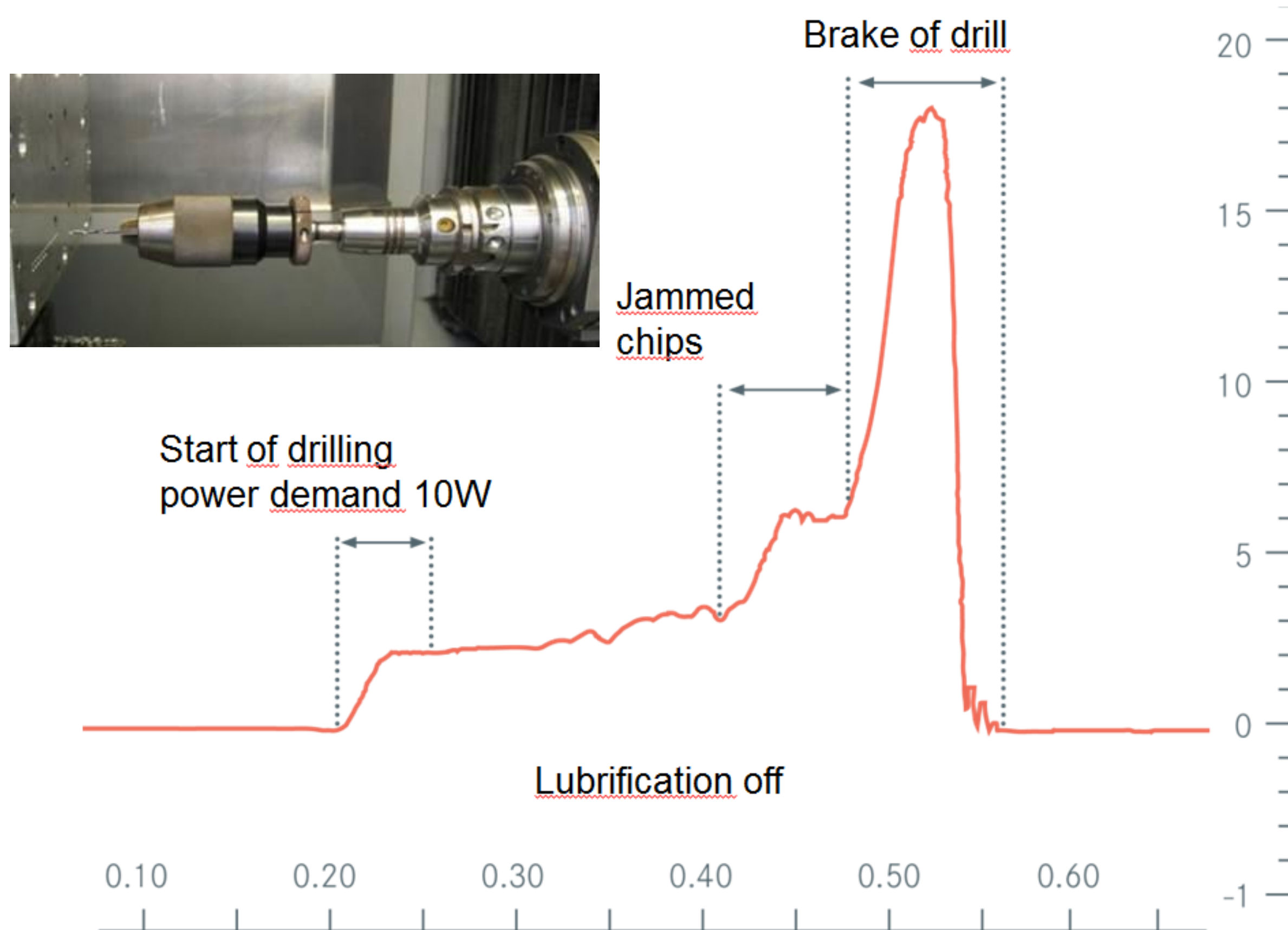
Detection of propeller damage during normal operation

Our **VirtualSensor** technology makes it possible to determine the torque of an electric ship's propeller in high resolution and in real time.

- Operating a propeller with e.g. 4 blades (as shown) does not generate an absolutely constant torque at constant speed:
 - Effects such as the "shadow" caused by the rudder result in a modulation of the torque 4 times per revolution.
 - If, for example, the shape or amplitude of one of the four modulations is different from the other three, then it is highly probable that a blade is damaged
 - Comparing the measurement with previous measurements allows conclusions to be drawn about wear

/ VirtualSensor: our experience advantage

Application: 50kW spindle with 2mm drill bit



Application: Special milling machine

Realized years ago for a special application:

- Spindle for milling and drilling with rated power 50kW
- Processes that required less than 0.1% of the rated power had to be observed in real time
- This was too unreliable with torque sensors
- VirtualSensor in the ARADEx spindle inverter solved the task and saved the sensor

Our sales team has more information and impressive videos on the potential of VirtualSensor ready for you!

/ VirtualSensor for mobile machinery

We make this technology available to you



VirtualSensor ready for your applications

... also especially for mobile applications and work machines in "heavy" environments.

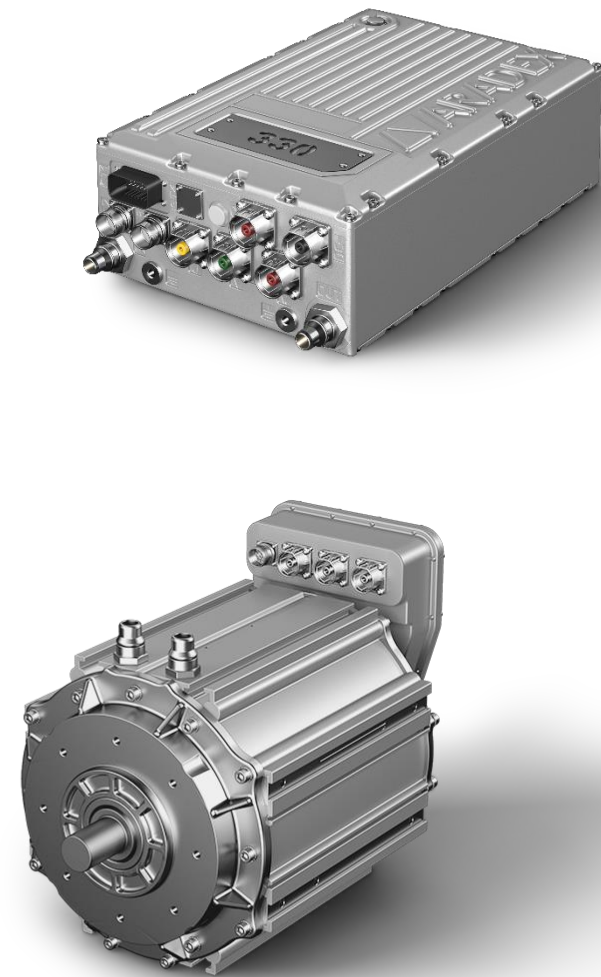
VECTOPOWER inverters offer you:

- Determination of the torque of electric motors in very high resolution and in real time, without any potentially interference-prone sensors.
- Integrated PLC functionality for processing these measured variables in real time.
- Synergy of inverter and machine controller: by combining the machine function in your controller with the extremely fast signal processing in the inverter.
- Integrated oscilloscope functions and log files for optimization, documentation etc.....

/ Possible contribution of ARADDEX to your project

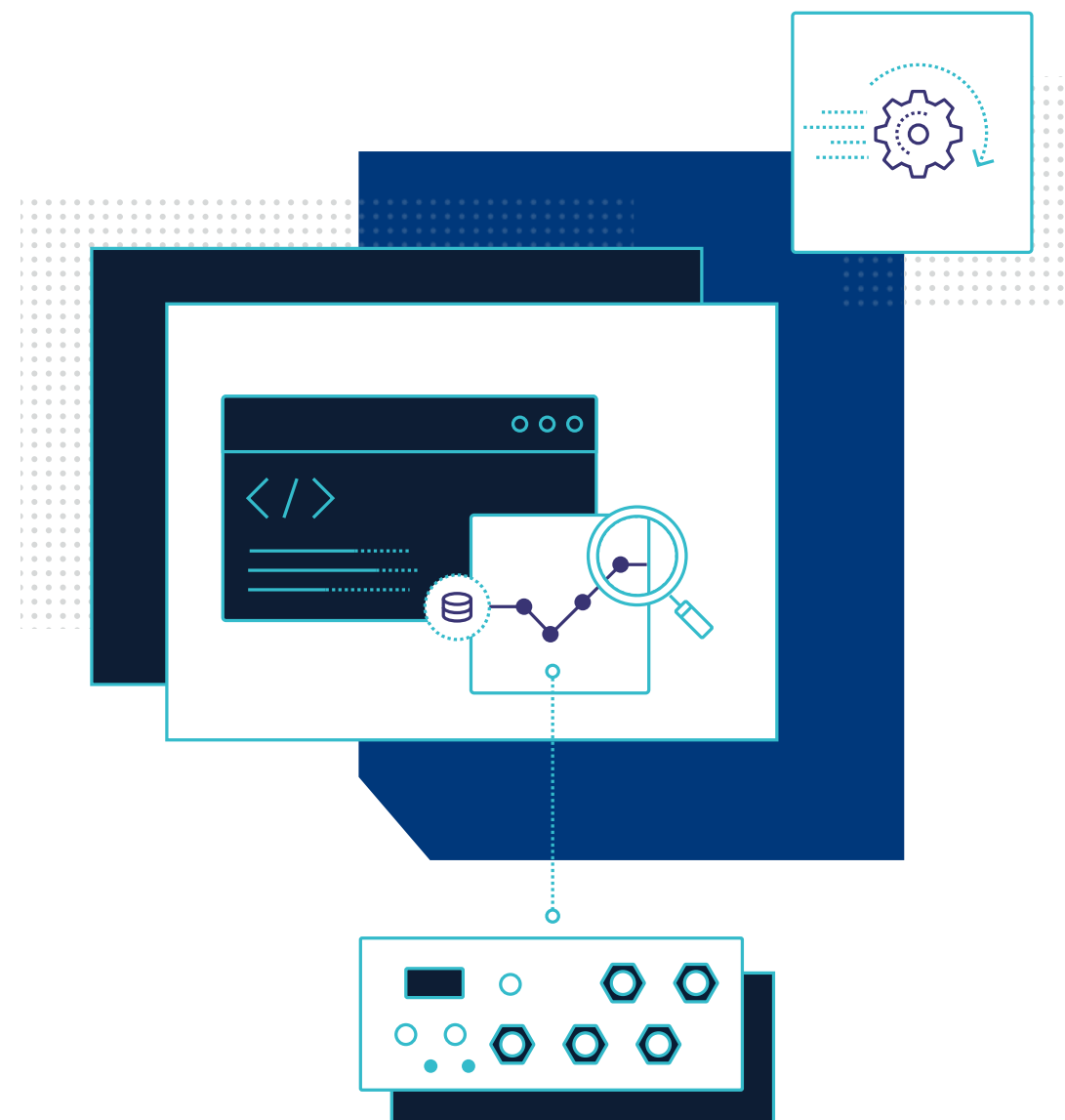
Hardware, software, tools

HARDWARE



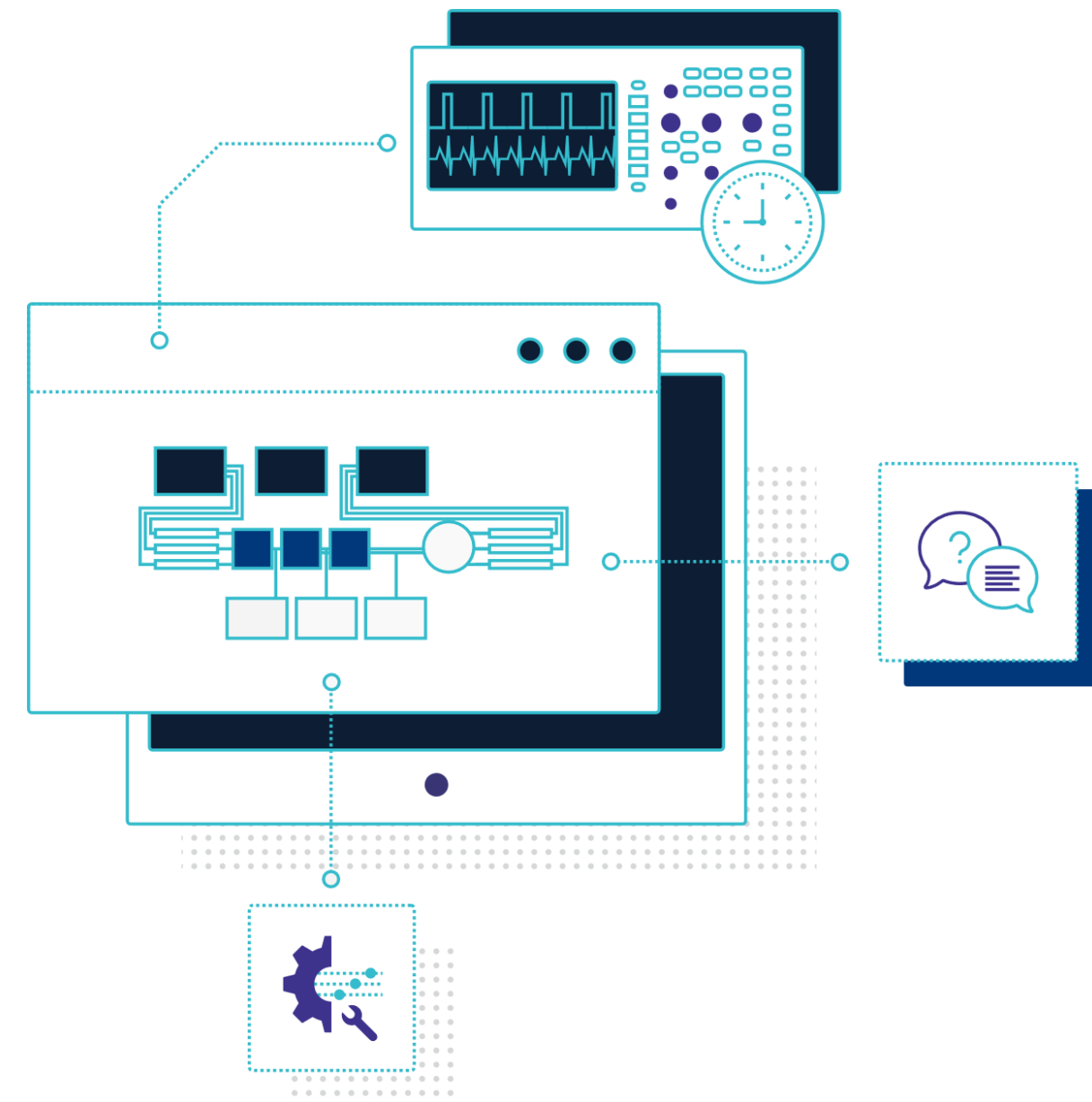
- Inverter
- E-motors
- Accessories

INTEGRATED SPS FUNCTION



- Sophisticated real-time PLC
- For function and diagnostics
- Your know-how, your USPs

TOOLS



- Programming
- Parameterization
- Oscilloscope function



Challenge us with your application!

**Proven added-value
mobile drive technology**



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