



TÉCNICAS Y SERVICIOS DE INGENIERÍA, S.L.

# Ni-CDS

Non-intrusive  
Cavitation Detection  
System

*A new tool to help achieve quiet oceans and  
protect marine fauna*

[www.tsisl.es](http://www.tsisl.es)

# Ni-CDS

## *Non-intrusive Cavitation Detection System*

The Non-intrusive Cavitation Detection System is a monitoring system which automatically detects the existence of undesirable cavitation by monitoring the vibration transmitted by the propeller/s to the hull.

Using TSI's patented algorithm, cavitation is detected in terms of both occurrence and intensity.



### Main features

- Standalone or integrated configuration into the bridge navigation systems or the Engine Control room.
- **Visual/acoustic alarm and graphic displays** at the bridge navigation systems and Engine Control room.
- Identification and **continuous monitoring** of propeller cavitation condition.
- **Data collection for statistical purposes** and production of hindcast/nowcast database of propeller behaviour.
- Helps ensure reliable propeller operation.
- **Report** Generation and data exportation.
- **Flexible and adaptable** to customer's needs.

### Main benefits

- **Enhanced lifetime** of cavitation-affected elements: rudder, propeller, etc.
- **Accurate control of cavitation intensity**, allowing navigation in noise restricted areas.
- **On board vibration level reduction.**
- Improvement of the underwater radiated noise signature.
- Improving the vessel performance in terms of **emission and fuel consumption optimization.**
- Detection of undesirable operating conditions.
- **Cost-effective** system and **non-intrusive installation.**
- Control of "silent modes" for Navy Ships and submarines.

## Installation

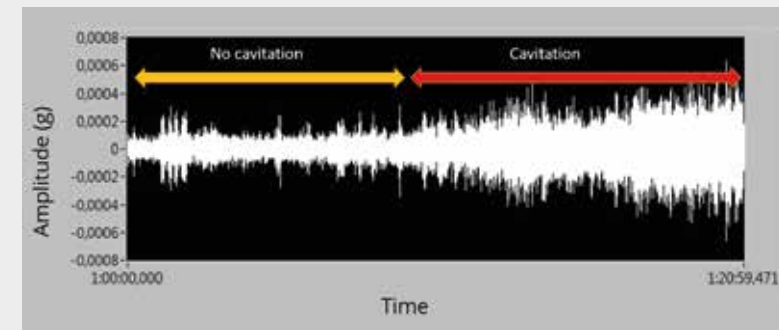
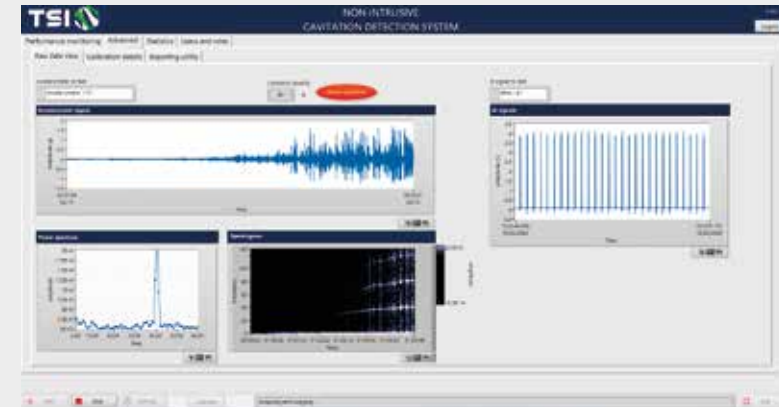
- Ni-CDS **installation** is **non-intrusive**: no hull penetrations, holes or any other severe interventions are required.
- **No need for dry dock services**, leading to time and cost savings.
- On board installation of sensors for accurate detection of the propeller cavitation existence and level of intensity.

## Commissioning & Calibration

- Ni-CDS's components can be provided with a **calibration certificate**.
- During the commissioning of the Ni-CDS, TSI includes an **onboard initial verification test** in the installation stage and subsequent verification assessments for ensuring the proper performance of the system throughout its lifetime.
- Calibration associated with draft. **Can be performed by non-experts**.

## Signal Processing

- Accelerometer signals are registered and processed by a **patented algorithm** (PCT/ES2017/070580), which automatically establishes a vibration threshold that defines the inception of cavitation.
- The system **enables analysis of the operating conditions in which cavitation occurs** by analysing the accelerometer signals and other quasi-static parameters.





## System Specifications

- Permanent monitoring by means of accelerometers.
- Acquisition Card: +/- 30 V 24-bit resolution.
- Sample Rate: 102.4 kHz per channel.
- Remote access via Ethernet/WAN/LAN
- Monitoring rate: Every second.
- Power consumption: <40W.
- Electronic unit dimensions: 482.2 x 263.0 x 132.5 mm.
- Two screens: control room and bridge.

## User Interface

Ni-CDS's user interface is **intuitive and user-friendly**. It offers **quick access to data/information** to operate the ship efficiently and safely. The main tabs for the control and use of Ni-CDS are:

- **The performance Monitoring tab displays indicators** of the propeller condition with a visual alarm, a map of the cavitation, and recent time evolution of cavitation.
- The statistics tab shows the **cavitation historic data**, the evolution of cavitation in a specific operating condition, and the cavitation path, which plots the cavitation spatially with the GPS signal.
- The advanced tab plots the historic data registered by the system and **useful graphs** related to the algorithm. It also has calibration, **test**, and **data download tools**.
- The settings window allows configuration of sensor settings, vessel features, and acquisition/storage logic by user-friendly panel.

### Validated in real-scale tests during vessel navigation:



See more:



## INPUTS

Quasi - static parameters\*



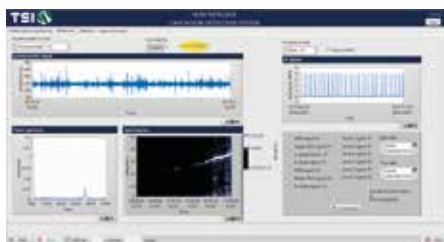
Accelerometers signals



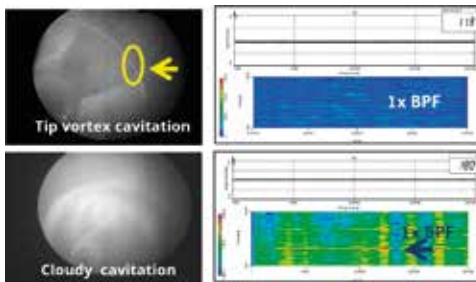
Tachometer signal



Ni-CDS ALGORITHM processing



Cavitation detection

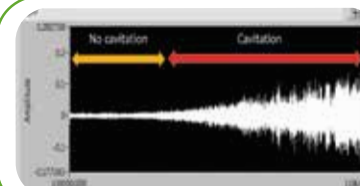


## OUTPUTS

Visualization at engine control room and bridge



Graphical user interface



\*Quasi-static parameters may vary, but the initial setting includes: vessel's speed, drafts, rudder angle and blade pitch.





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