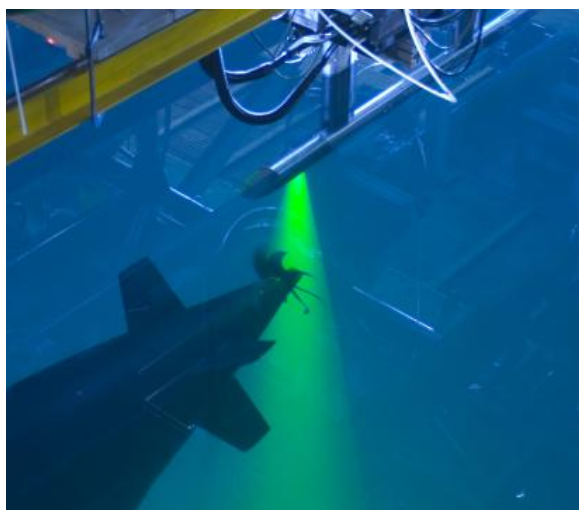


# TOWING TANK STEREO PIV SYSTEM EXCLUSIVELY FROM TSI

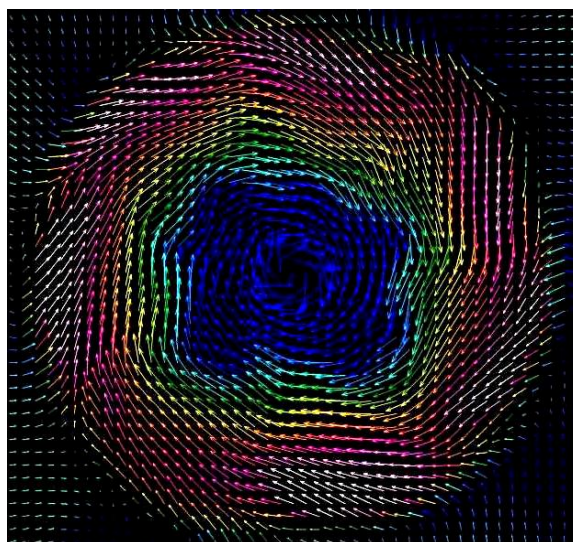
APPLICATION NOTE STEREOPIV-008

TSI now supplies a unique Towing tank underwater stereo PIV system for measurements of velocity behind propellers\* and flows around ship models.



The system offers a modular design to allow various system configurations to meet specific applications. Either the PowerView™ Plus 2MP or 4MP cameras can be used with the system to provide optimal pixel resolution for the measurements. Operation of the system is performed through the powerful *INSIGHT™ 3G* software package, making the image capture, stereo calibration and data analysis easy and robust. The control of the Scheimpflug angle adjustment is done remotely and in real time for stereo configuration with the most accurate measurements. Powerful features including Stereo AutoMapping and Direct Image Particle Analyzer provide optimization of the stereo calibration and the measurement of bubbles and fluid velocities. Results from the system help researchers get the

detailed structure for flow behind propellers\* and flow characteristics around ship hulls.



## Modular Design

The modular design of the system is both unique and important for researchers. Since there are many aspects of the flow measurements due to the types of the models and the region of interest, the different configurations offer the flexibility to put together the system for the optimal arrangement. Subsequently, the most desirable results can be obtained.

The Camera module, Mirror module, Light Sheet optics module and the Strut module make up the four main modules for the system. In addition hydrodynamic cones are provided to offer a streamlined shape to the system, which minimize flow disturbance to the measurement region. The powerful PowerView™ Plus series of camera is used to allow the best image quality and pixel

\*Acknowledgement: TSI would like to thank INSEAN for providing the picture and results given in this page.

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resolution. All brands of Nd:YAG lasers can be used with the system; however laser energy of 200 mJ or higher is generally recommended.

**Camera Module** (shown in magenta) includes the motorized Scheimpflug rotating mount for the PowerView™ Plus camera. The mount is also equipped with motorized adjustment of the focusing and aperture for the camera lens. The module is pressurized to ensure no leakage to the internal components. A humidity sensor located inside the module provides continuous monitoring of the conditions.

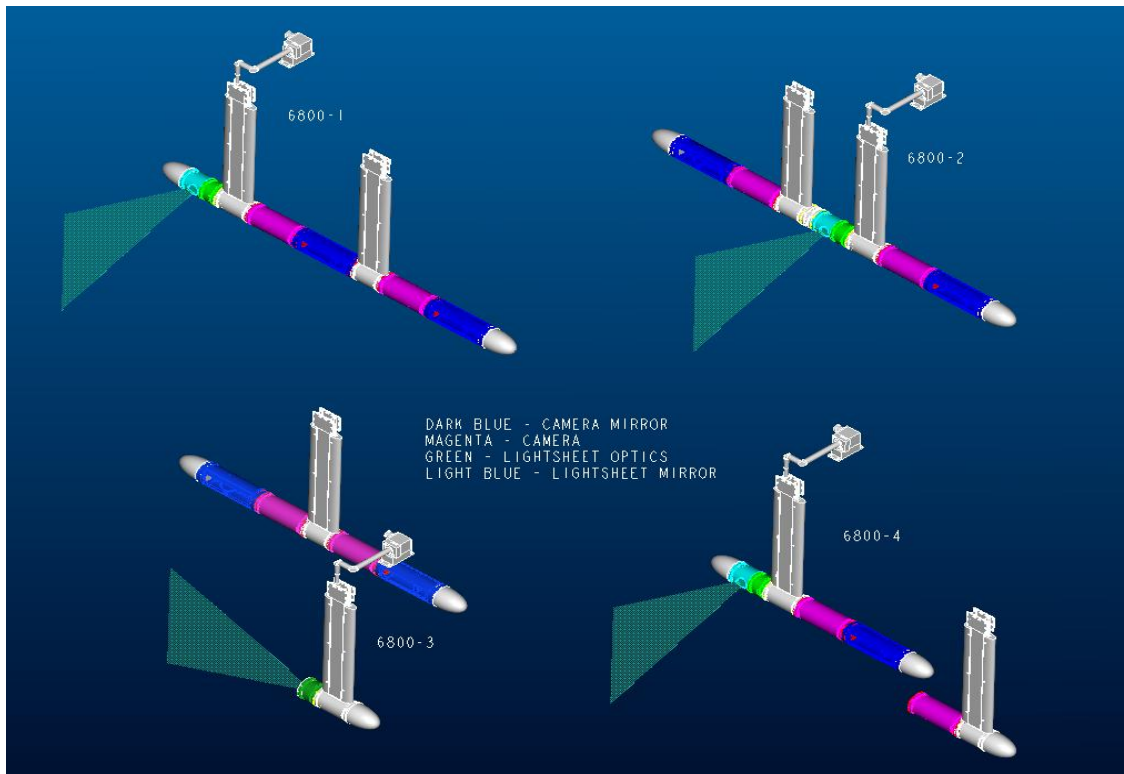
**Mirror Module** (indicated in dark blue) consists of a sliding mirror to allow the continuous adjustment of the measurement region. The module is exposed to the fluid to minimize distortion due to the air-fluid interface.

**Light Sheet Optics Module** (colored in light blue) has the set of cylindrical and spherical lenses to give the desired light sheet illumination for the

measurement. In addition an internal light arm is included to bring the laser light beam to the light sheet optics. Adjustment of the light sheet dimension can be done by changing the cylindrical and spherical lenses.

**Strut Module** (displayed in silver) provides the support of the system. The struts can be mounted onto a traverse system to allow positioning of the system for the specific measurements. The struts also house the laser light arm and all cables to ensure the system is completely water tight. The standard length of the strut is 1 meters, however lengths up to 1.6 meters can be accommodated upon request.

Four typical system configurations using the various modules are given in the diagram below, for flow measurements at different regions. Many other configurations can be assembled to give the most versatile and powerful underwater measurements.



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USA	Tel: +1 800 874 2811	India	Tel: +91 80 67877200
UK	Tel: +44 149 4 459200	China	Tel: +86 10 8251 6588
France	Tel: +33 4 91 11 87 64	Singapore	Tel: +65 6595 6388
Germany	Tel: +49 241 523030		