

# NAVAL SECTOR

***Principia has been supporting the success of ship development projects worldwide since 1981. Our track record covers projects for all type of ships :***

- Navy ships (frigates, aircraft carrier, submarines),
- Passengers ships as cruise and ferries,
- Merchant ships (tankers, LNG, container ships),
- Specific ships (scientific, new concepts),
- Oil and gas service ships.

We deliver expertise and engineering design services applied to these ships, from the early design stage to the detailed studies. We provide also expertise in case of emergency situation or legal enquiries.

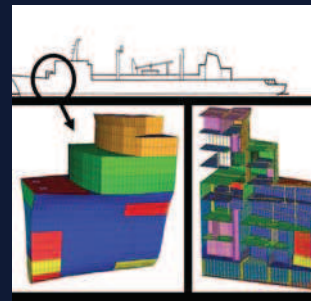
Principia has offices in France, Singapore and Houston and can provide expertise and engineering services worldwide.

## ***Our scope of services covers today :***

- Design studies : Preliminary Design of Yachts, Supply Boats, FPSO, barges, etc.,
- Hydrodynamic studies : Sea-keeping, Roll damping, Stability, Hull and appendage definition, CFD analysis for hull resistance and viscous effects,
- Fluid structure studies : Sloshing, Coupling effects, Structure studies : strength assessment, finite element analysis, calculation notes for Rules, Fatigue calculations,
- Dynamical studies : vibrations, comfort onboard, impacts, slamming,
- Security aspects : simulation of accidental events onboard (collision, explosion), evacuation, flooding, survivability, time to sink, grounding, pollution, stability after damage, ...
- Ship Engineering : conceptual design of barges, vessels (weight report, stability report, general arrangement, ...),
- Fuel consumption economy and security onboard system,
- Embedded systems onboard : stability, strength assessment monitoring, line shaft bearing monitoring, etc.
- Specific Monitoring systems development and installation onboard.

Principia also offers privileged access to some of the main French high technology model test basins.

For 25 years, our expertise in core scientific disciplines as structural design, fluid-structure interactions, hydrodynamics and fluid dynamics has built upon multi-sector research and development activities (naval, marine, renewable energy, nuclear, space, automotive,...) and partnership with National research centers, Universities and engineering schools.



CONCEPTION AND DETAILED STUDIES



SHIP TO SHIP COLLISION



SLAMMING SIMULATION

# References

## *Our clients include :*

- ▶ **French Navy** : DGA, CTSN  
Main Shipyards for war ships and large ships : DCNS, STX, CMN, CNIM, OCEA
- ▶ **Other shipyards** : PIRIOU (fish ships)...
- ▶ **Ship owners** : GDF SUEZ, TOTAL SHIPPING, CMA CGM, BOURBON
- ▶ **Engineering industries and suppliers** : WARTSILA, CONVERTEAM, SAIPEM, BE MAURIC, GTT, ACERGY...
- ▶ **Administrative and other institutions** : Ville de PARIS, IFREMER, ...

## *Sample of projects Principia worked for :*

- ▶ **Cruise and Ferries** : Queen Mary 2, Renaissance, Millenium, MSC Musica, MSC Magnifica, NGV Corsaire, ...
- ▶ **Fish and specific ships** : Senneur Piriou, Pourquoi-Pas, LCAT, EDA-R Catamaran, ...
- ▶ **War ships** : Charles de Gaulle aircraft carrier, Sawari, Delta, Horizon, Fremm, BPC, M51, CETACE, Vigilant, Scorpène, Barracuda
- ▶ **Far-east** : Drillships, pipe installation vessels, ...

## *Principia is also involved in thematic networks :*

- ▶ ISSC, ECMAR, MARSTRUCT
- ▶ ATMA, GICAN, BV technical days,
- ▶ Pôle de compétitivité MER PACA et BRETAGNE



### **FRANCE**

PRINCIPIA  
ZI Athélia 1 – 215 Voie Ariane  
13705 LA CIOTAT Cedex  
Tel : + 33 (0) 442 98 11 80  
Fax : + 33 (0) 442 98 11 89  
commercial@principia.fr

PRINCIPIA  
1 Rue de la Noë  
BP 22112  
44321 NANTES Cedex 3  
Tel : + 33 (0) 240 14 50 14  
Fax : + 33 (0) 240 14 34 00  
commercial@principia.fr

### **SINGAPORE**

PRINCIPIA ASIA PACIFIC ENGINEERING  
12 International Business Park  
Cyberhub@BP#02-03  
SINGAPORE 609920  
Phone : + 65 6505 0300  
Fax : + 6505 0301  
pape@principia.sg

### **USA**

PRINCIPIA  
C/O Forum Services  
1900 West Loop South, Suite 850  
HOUSTON, TX 77027  
Phone: +713-993-0797  
Cell : + 713-291-8429  
cedric.lecunff@principia-engineering.com