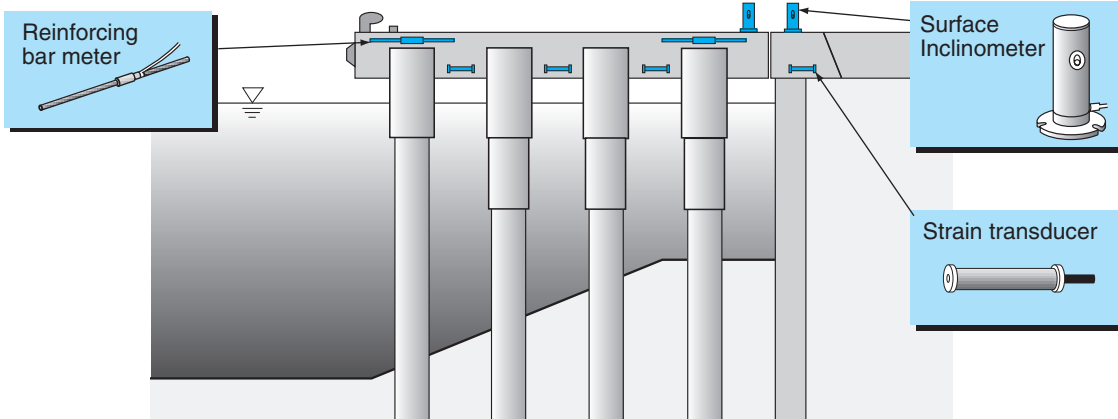


# 13 Marine Structure Measurement

## Landing Pier Measurement

The following tests are conducted to survey the aging conditions of a pier:

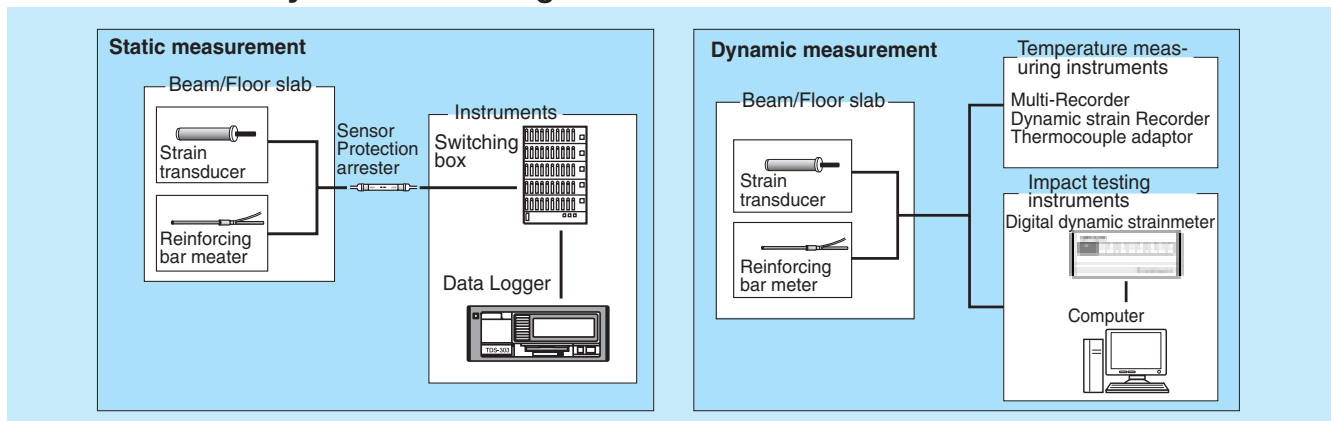
- **Static measurement**  
Stress and strain on a pier under no-load conditions are measured.
- **Dynamic measurement**  
Stress and strain on a pier are measured by running a vehicle, such as a forklift loaded with maximum weight assumed to be applied.
- The stress and strain of a pier are measured when a ship of 10,000 D.W.T. or heavier comes alongside the pier.



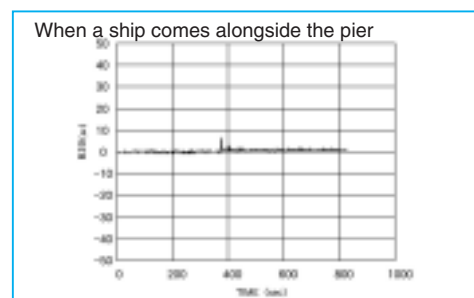
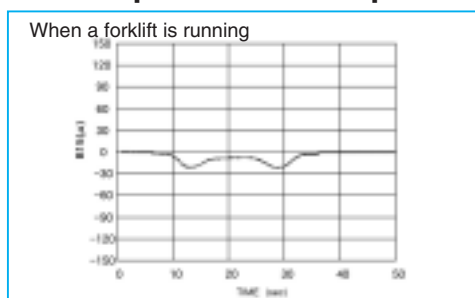
### A list of Measuring Instruments

Items	Instruments	Type	Description
Stresses in piers	Reinforcing bar meter	KSA-A KSAT-A	Reinforcing bar stress transducers are installed in the directions perpendicular to and parallel to a normal line of a main beam reinforcement or a floor slab to measure strain on the bars.
Strains in piers	Strain transducer	KM-A/-AT KM-B/-BT	Strain transducers are installed in the directions perpendicular to and parallel to a normal line of a main beam reinforcement or a floor slab to measure strain on concrete.
Temperature in piers	Thermocouple Temperature gauge	T KT-A	Monitors temperature distribution within the pier
Inclination of pier	Inclinometer	KB-AB, KB-AC	Measures and monitors the behavior of pier

### Measurement System Block Diagram

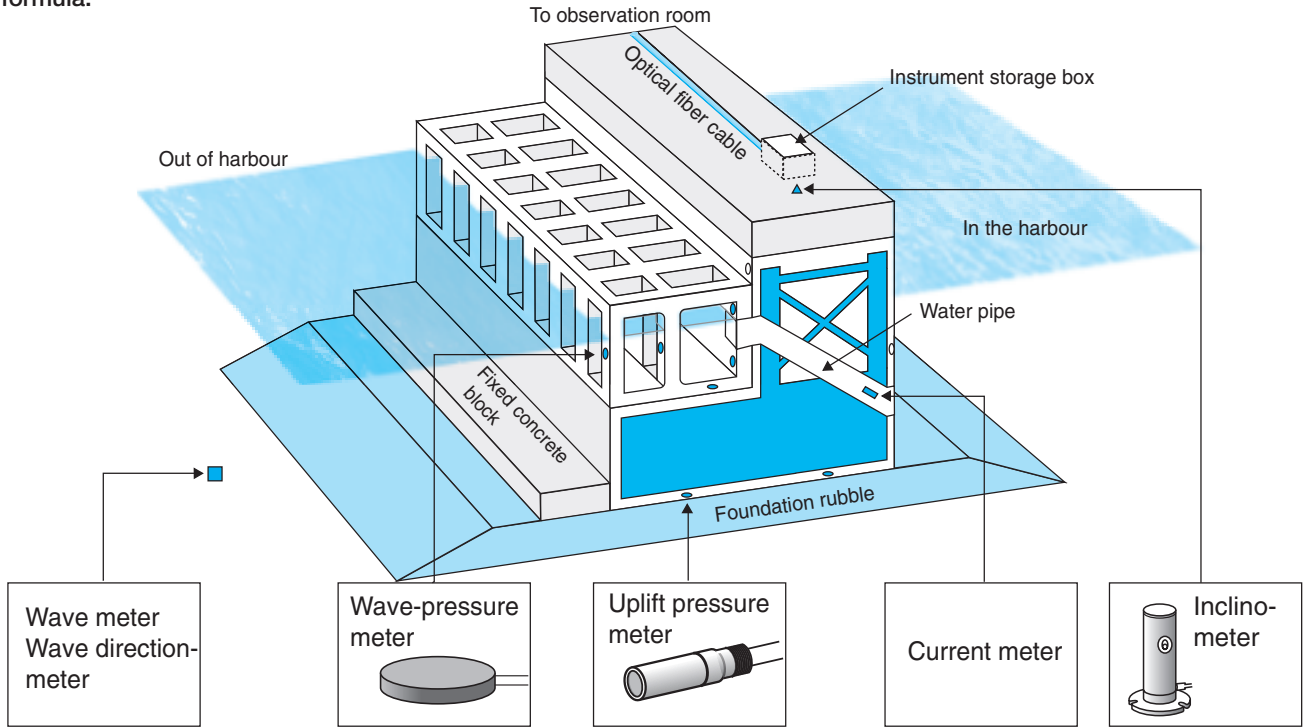


### Examples of data output

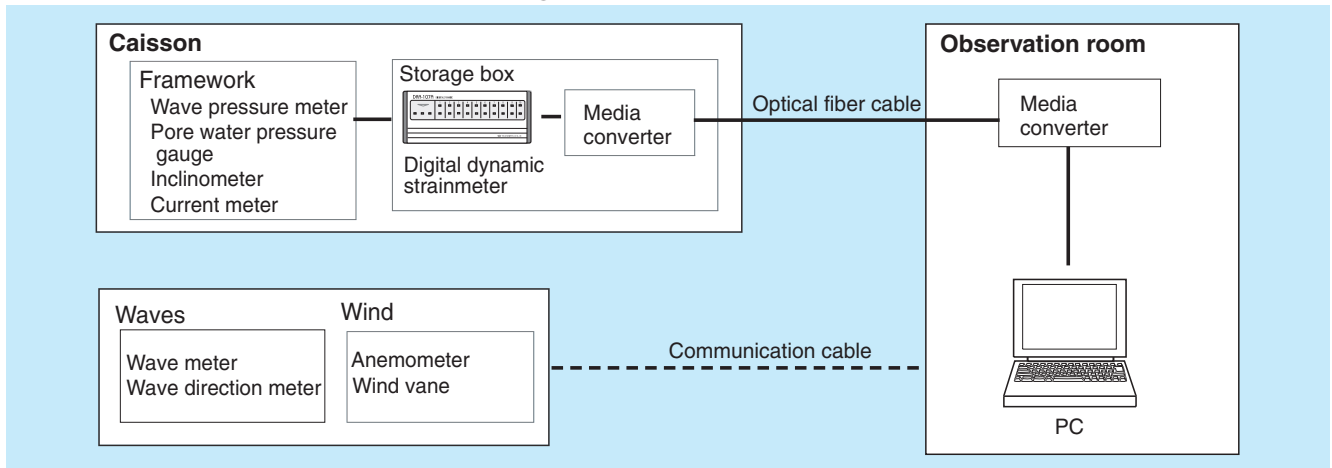


## Caisson Type Quay Measurement

The details of distribution of wave pressure and uplift pressure acting on a caisson type quay in high waves are measured to verify the stability of wave endurance and confirm the practicability of using a designed wave pressure formula.



### Measurement System Block Diagram



### A list of Measuring Instruments

Measurement Items	Instruments	Type	Description
Wave pressure of members	Wave pressure meter	KDD-PA	Monitors wave pressure distribution of each member
Uplift pressure of bottom bed	Pore pressure gauge	KPA-PA	Measures uplift pressure acting on the bottom bed of the main body and the lower floor bed of retarding room
Inclination of caisson	Inclinometer	KB-AB, KB-AC	Monitors inclination of the main body.
Current speed in water pipe	Current meter	Other maker	Monitors the speed of current in the water pipe.
Waves	Wave meter	Other maker	Monitors time-dependent wave when receiving a pressure of wave.
	Wave direction meter	Other maker	
Wind	Anemometer	Other maker	Monitors time-dependent wind when receiving a pressure of wave.
	Wind vane	Other maker	