Makes use of the entire TNO organization's expertise in giving advice on civil construction, offshore, shipbuilding and

TNO Building and Construction Research

machine building. Combines many areas of research, such as building and materials technology, fire safety, indoor environment, construction, numerical mechanics, strategic studies and quality assurance.

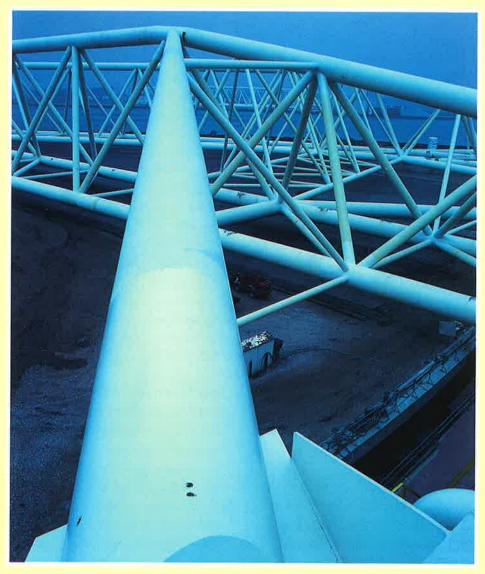
Primary fields of activity include:

- structural engineering and design
- · materials
- · structural testing
- · building processes
- · fire research
- · timber research
- indoor environment, building physics and systems
- · mechanical engineering
- strategic studies, quality assurance and building regulations

For further information, please contact: TNO Business Information Desk

P.O. Box 6050 2600 JA Delft The Netherlands

Tel.: +31 15 269 69 69 Fax: +31 15 261 24 03 E-mail: infodesk@tno.nl WWW: http://www.tno.nl/



TNO Building and Construction Research has helped to design the Maeslant storm surge barrier which is a vital part of Dutch sea defences. TNO performed a study on the failure characteristics of the structure and researched the greasing of the huge ball hinge (diameter of 13 m) that is used to open and close the barrier.



Primary fields of activity in further detail:

Structural engineering and design

- Structural design and construction technology.
- Final detailing of building components.
- Product innovation.
- Evaluation principles for components of the built environment.

Materials

- Physical and mechanical properties of materials.
- Moisture transport and thermal insulation.
- Preservation of historic buildings from air pollution.
- Mechanical behaviour of concrete, timber and masonry structures.

Structural testing

- Reliability of structures, both existing and in design.
- Computing techniques, realistic models, structural details.
- Fire resistance of structures.
- Offshore structures.
- Model testing of structures difficult to analyse.
- Strength and stability of structures.
- Structural details, joints.

Building processes

- Methodology of the building process and a systems approach to quality control and maintenance.
- Mechanization in building and construction.
- The application of information technology in building:
- FEM in applied mechanics.
- linear and non-linear analysis of structures using DIANA, a general purpose finite-element system.
- utilization of the research results implemented in the product versions of DIANA.
- Dynamic problems: vibration phenomena, wind loading and problems in connection with piling.

- Electronic measuring techniques: pile diagnostic systems, monitoring of structures and integrity tests.

Fire research

- Research into the causes and consequences of fire.
- Combating fire.
- Fire prevention.
- Behaviour of materials and structures subjected to fire.
- Smoke hazard and smoke spread.
- Fire detection.

Timber research

- Testing and technical consultancy.
- Structure of wood and identification of wood species.
- Testing of wood, timber structures, furniture and joinery work.
- Drying properties of wood, and advice on kilns.
- Preservation of wood.
- Wood chemistry, including composition, durability, decolourization, bleaching and finishing.
- Wood stabilization.
- Technological timber research: joints and adhesives; timber engineering, sheet materials, and wood waste.
- Quality and tolerance: finishes for surfaces using paints, varnishes, and foils.

Indoor environment, building physics and systems

- Physical and chemical aspects of the working environment in industry and in public utility buildings; technical solutions and policy studies.
- Indoor climate quality in homes; chemical and biological contamination; indoor climate control systems: humidity and dust control; ventilation problems.
- Relationships between indoor environmental quality and energy consumption.
- Heat technology: energy saving, solar energy, heat storage, building physics.

- Acoustics of buildings and rooms.
- Lighting: daylight and electric lighting;
 electronic control of light; design of combined daylight and electric lighting conditions.

Mechanical engineering

- Fatigue, collapse and unwanted structuro-dynamic behaviour.
- New design techniques for structures and machines.
- Determination, assessment and optimization of mechanical behaviour of structures, installations and equipment with respect to safety, reliability, efficiency, durability and the environment.
- Design and construction of specialpurpose test machines, for example shock testing.
- Design to protect against underwater explosion and shock; design of proper shock specifications, laboratory testing of shock resistance and field measurements during shock testing of ships at sea.
- Design-oriented R&D on composites for naval ships, offshore installations (housing) and the building industry.
- Non-linear dynamics of rotating equipment and robot components; worldwide field measurements of mass, strain, stress, pressure, force acceleration, and velocity of displacement.
- Development of condition monitoring systems for rotating equipment on the basis of measurement techniques, tribology, structural mechanics and computer technology.

Strategic studies, quality assurance and building regulations

- Literature surveys, problem analysis, auditing, research programmes, strategic planning.
- Models for quality management (MKS intelect).

