TNO innovation for life

TNO - Offshore Wind

Tokyo 30th October 2014, Trade Mission Japan – The Netherlands

Harald van der Mijle Meijer

TNO innovation for life

TNO

- Independent, by law 1932
- Research organization of about 3800 people
- Excellent knowledge on many domains
- Theme TNO Maritime and Offshore;

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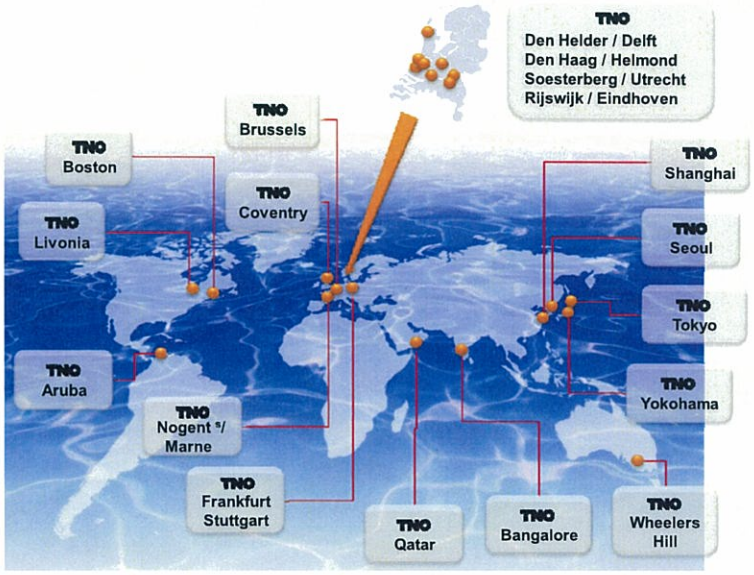
TNO globally



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High Tech Maritime & Offshore facilities


Structural Dynamics Lab.


Shock & Vibrations lab.


Hyperbaric chambers


Acoustic lab & basin


Offshore teams


Corrosion & fouling lab.


Free fall Lifeboat lab


Windtunnel facility

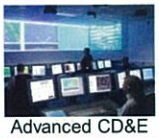

HF & Desdemona


Blast & Ballistic Research Lab.


.Pyrotechnics Lab.


Arctic climate chamber


Fire test site


Advanced CD&E Environment ACE

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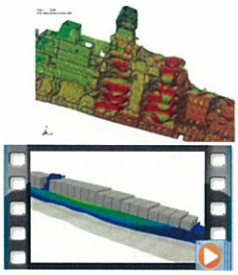
Structural Dynamics and Reliability

- Develops, analyses and tests the most varied constructions on land and water, focus on the dynamic behaviour

Fatigue & Fracture

Shock & Impact



Hydrodynamics & Slamming

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Corrosion and bio-fouling

- Corrosion and antifouling research since 1964
- Expertise's
  - Corrosion & Electrochemistry
  - Degradation (polymers/FRP)
  - (Micro) Biology & Bio corrosion (MIC)
  - Coatings & Metallurgy
- Natural seawater basin

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Acoustics and Sonar

- Ship and underwater acoustic signatures
- Underwater warfare and security
- Underwater noise and environment
- Noise control engineering
- Impulsive noise
- Marine mammal research

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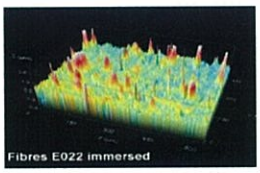
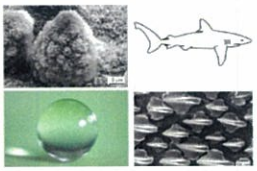
Materials for integrated products

- Applied surface science
- Nano coatings
- Mechanical degradation
- Surface durability





Human Factors

- Develop new technologies that optimize the observe, decide and act of crews
- Heavy weather ship handling simulation
- Discomfort and seasickness prevention
- Innovative ways of working
- Work environment design

Integrated Vehicle Safety, Lifeboats

- Robust and fault-tolerant intelligent vehicle systems
- Accident analyses, development of methodologies
- Development crash test methods and crash dummies
- Integral safety (active and passive) and seat comfort
- Climatic – altitude chamber

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Floating offshore platforms
Learning from other industries

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Offshore Wind programs TNO 2000 - 2014

- EU WALiD – Cost effective offshore wind turbine blades
- EU NATURAL – Smart windturbine blade coatings
- WCWM – Condition based maintenance windturbines
- FeLoSeFI – Fatigue life new approach
- Bluepiling – Installation technique sub sea noise
- MIMIC – Fracture nanoscale wind turbine blade composites
- D OWES – Assett management – bio-corrosion sensor
- ÆRTOs – Low cost corrosion protection Offshore Wind
- MCN EFRO – Corrosion monitoring offshore structures

- And many industrial projects for offshore wind

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Offshore Wind programs open for you to join!

- **JIP Offshore Maintenance** – Human factor in offshore maintenance
- **EUROS** – Windturbine and structure modelling
- **JIP MONITOR** – Condition monitoring substructure
- **JIP iShare@Wind** – Open data standard for offshore wind
- **JIP PROCORE** – Corrosion protection offshore wind

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Collaborative initiatives (Technology + Ecology + Biology)

Maritime Consortium of Environmental Science and Technology **MUST**

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Global Ocean Innovation

Independent shared research and development for sustainable exploitation of the world ocean resources

- Environmental impact assessments and risk management
- Sustainable operations
- Rules and regulations
- Monitoring

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Thank you for your attention

Harald van der Mijle Meijer
Offshore Wind
harald.vandermijlemeijer@tno.nl

Jan Hoegee
Director Maritime and Offshore
j.hoegee@tno.nl

Source: www.flyingfocus.nl