

Norwegian Centre for Coastal Technology NCCoast Status and the way forward



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Outline

- **Motivation**
- **Overview of NCCOAST**
- **Objective**
- **Broad or narrow focus – examples from Norconsult**
- **Sustainability and environmental based design**
- **The way forward**
- **Discussion**

Why NCCoast?



- **A national centre** for education, research, innovation and industrial competence. Competence within a broad range of coastal technical applications.
- **A mean** to keep the unique Norwegian coastal technology knowledge relevant, attractive, consistence and on an international excellence level.

Overview of NCCoast



NCCOAST - objectives

- **Education**

- Increased student attraction

- **Research**

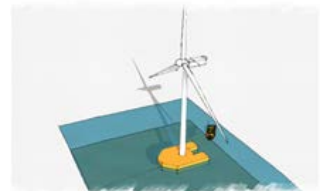
- Increased activity, research positions and dissemination

- **Innovation**

- Accelerated innovation with focus on maturity, technical readiness and industry applicability

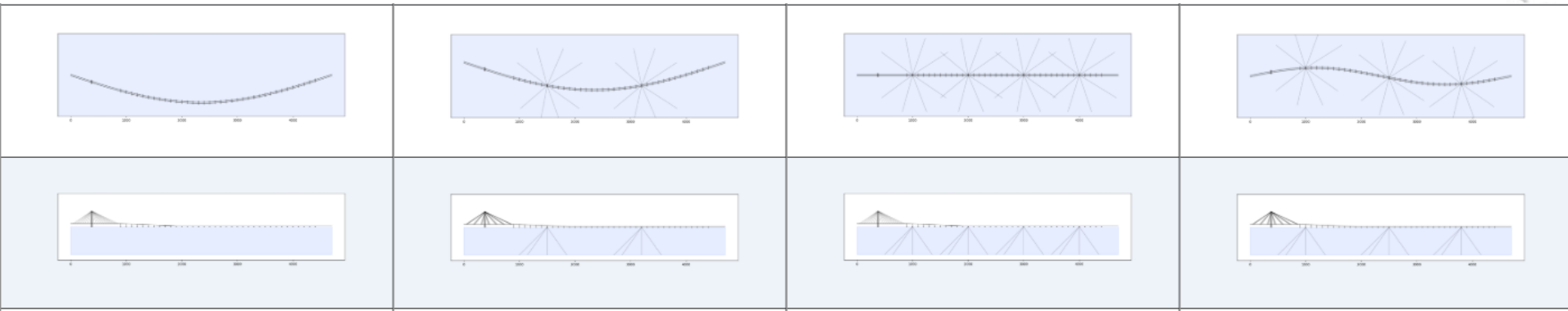
Is NCCOAST too broad?

- Coastal (or limited water depth open sea) wind, waves and current – metocean design
- Ice loads
- Coastal infrastructures
- Harbors
- Floating closed aquaculture or exposed aquaculture
- Ocean energy
- Floating bridges
- Novel coastal structures
- Data interpretation – full scale measurements
- Coastal operations
- Coastal architecture and environmental design

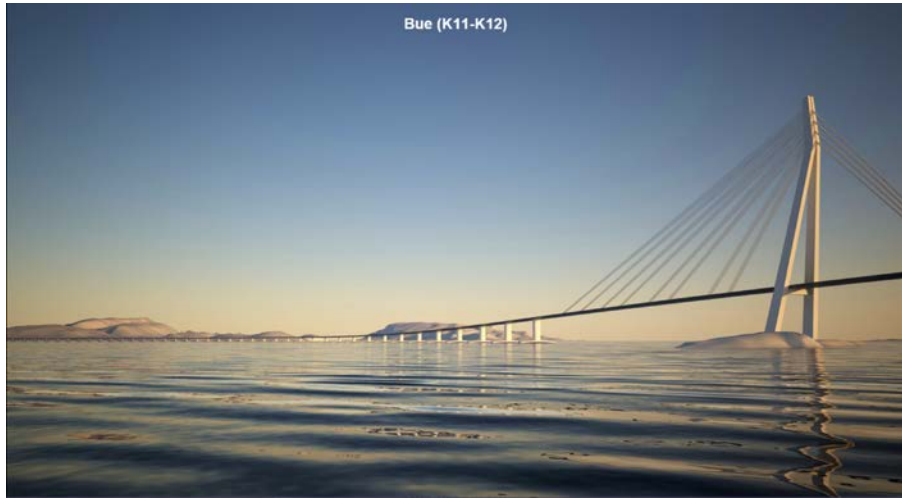


Example Coastal Application Bjørnafjorden

- 5 km floating bridge
- 4 different concepts
- 2 competing design teams -2x40000 hours – ½ year
- Goal: design and specify one recommended cost efficient concepts
- Norconsult Trondheim office: Hydro- and aerodynamics



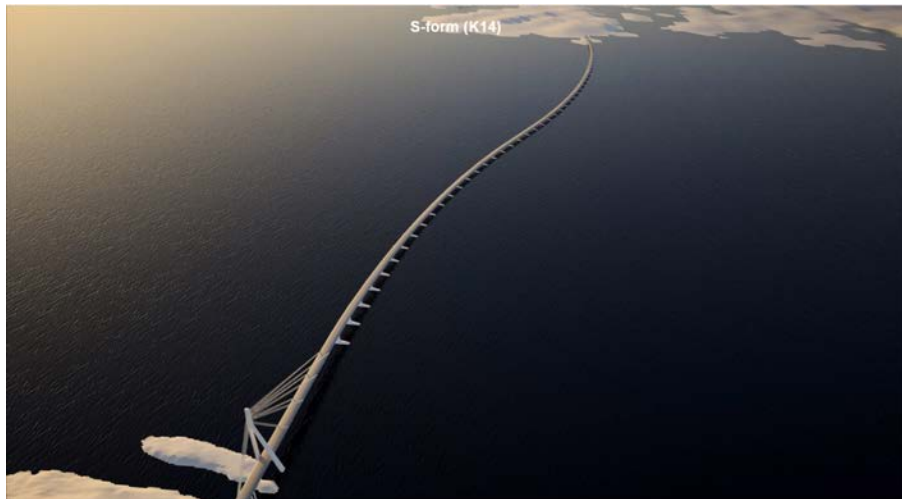
Bue (K11-K12)



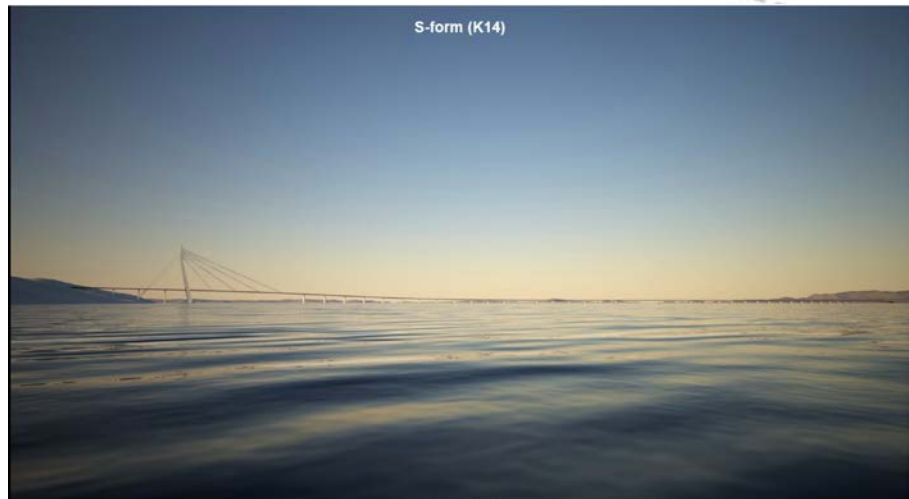
Rett (K13)



S-form (K14)



S-form (K14)



Parametric resonance – requires in depth dynamic understanding of the structure +
in depth metocean understanding

$$\sigma_N \leq 0.4A_c \quad A_{cr} = 4\xi \frac{\tilde{K}}{\tilde{K}_G} \quad \xi = \frac{\tilde{C}}{2\sqrt{\tilde{K}\tilde{M}}}$$

Sustainability and environmental based design

- **Main objective:** To develop knowledge and innovative technology to **mitigate environmental impacts** from coastal structures and operations
- **Loss of habitat**, habitat degradation and fragmentation are regarded major threats to biodiversity
- **Examples:**
 - Current flow ecology relationships
 - Closed aquaculture systems
 - Artificial reefs
 - Environmental monitoring

Anti-fouling



(european-coatings.com, accessed 2012)



Historical coastal design versus new



- Historically:
 - Buildings in **human scale**
 - **Location customized** buildings
 - Architecture is dependent on **functional needs**
 - Clean and aesthetic selection and use of **materials**



The way forward

- **Basis financing from NTNU – main work packages**
- **Establish national partners together with NTNU:**
 - IFE, UIS, NTNU Ålesund, UiB, SINTEF, MET, UiT, UiO, UNIS
- **Form NCCOAST user group with participation fee**
Norconsult, Equinor, Multiconsult, Aquaculture operators, Fred Olsen, Nexans, Sjømat Norge, Industry and public entities as The Public Road Administration, Norwegian Coastal Authority, Ministries and harbour owners
- **Direct contact with governmental entities**

NCCOAST anno 2028

RESEARCH and EDUCATION

FULL SCALE MEASUREMENTS
Ocean Space Laboratories

EDUCATION

- 20 BSc
- 32 MSc
- 8 Industry PhD - students
- 6 PhD - students
- 1 Professor I (administrator)
- 2 Professor II (administrator)

RESEARCH AND INNOVATION

- 10 Large research projects
- > 200 MNOK (2020-2028)
- > 4 Researchers
- > 6 Innovation PhD projects

LABORATORIES
Ocean Space lab -
Valgrinda