KTH ROYAL INSTITUTE
OF TECHNOLOGY

Safe and durable concrete structures
- A prerequisite for sustainable hydropower

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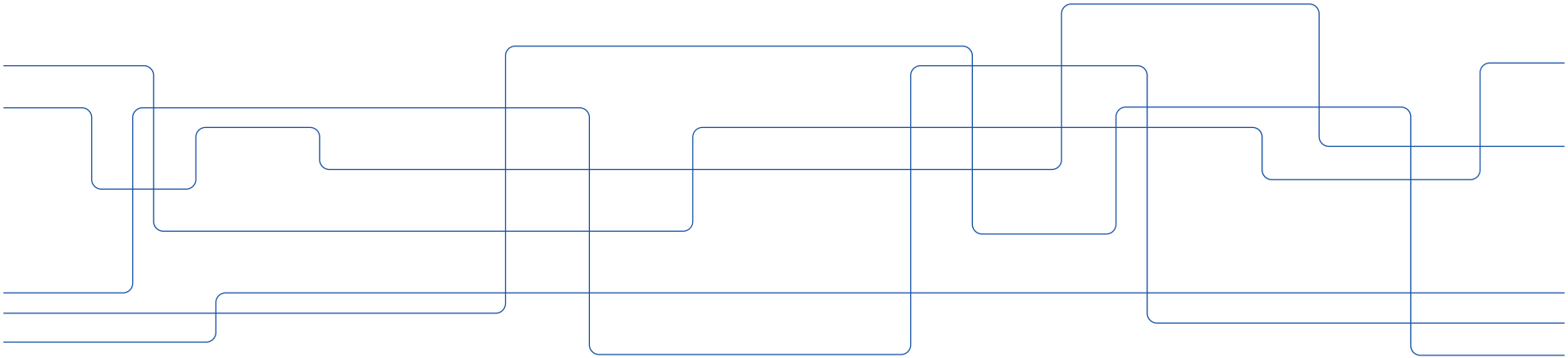
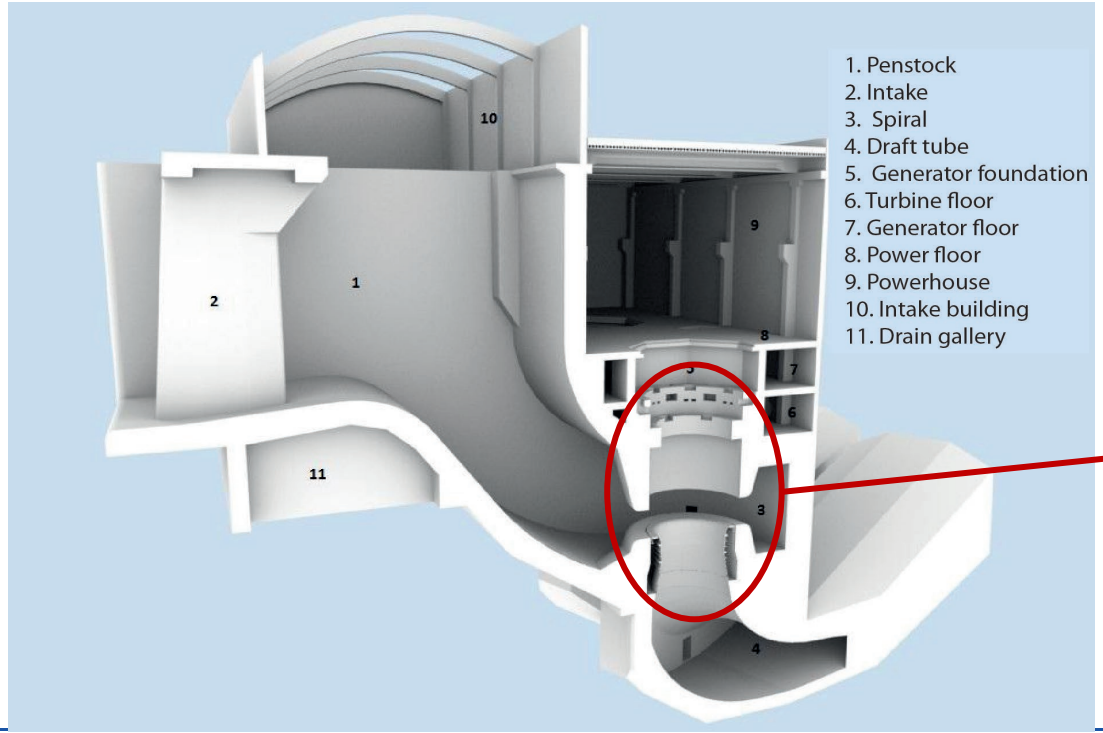
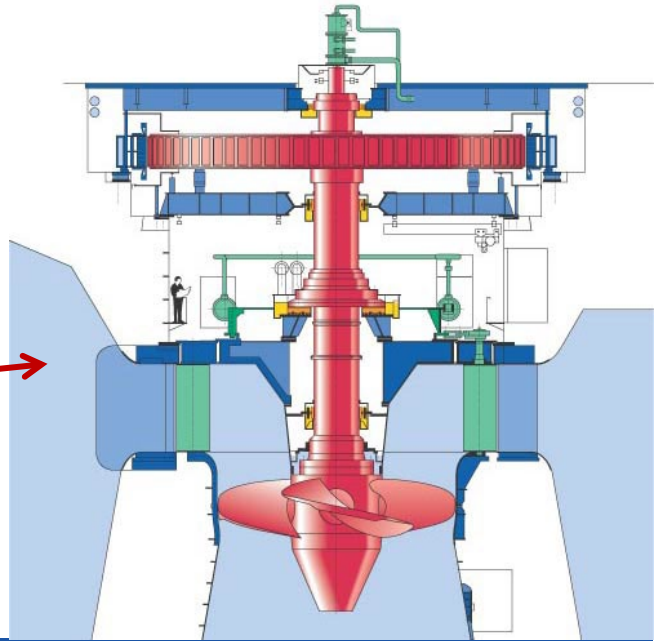


Concrete in dam structures

- Water retaining structures – dam body, intake structures
- Discharging structures – spillways, outlets, guiding walls
- Energy dissipating structures – baffle blocks, splitters, bassins
- Supporting structures – soil retaining walls etc.

Concrete in HPP





Safe?

Dam safety –

”License to operate”

High availability and

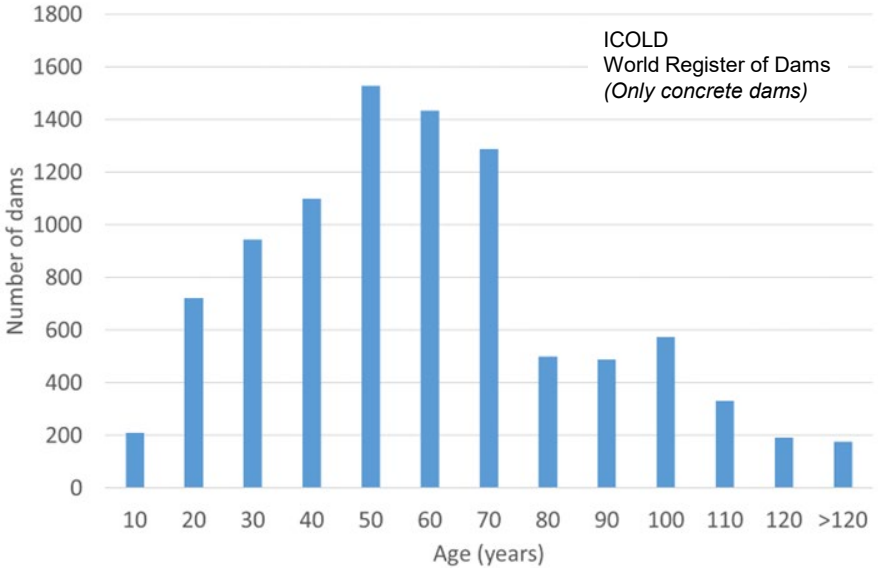
production capacity

Dam safety?

Safely store and discharge water

- Acceptable stability & act monolithically
- Sufficient load-bearing capacity
- Impervious to prevailing hydrostatic pressure

Durable?



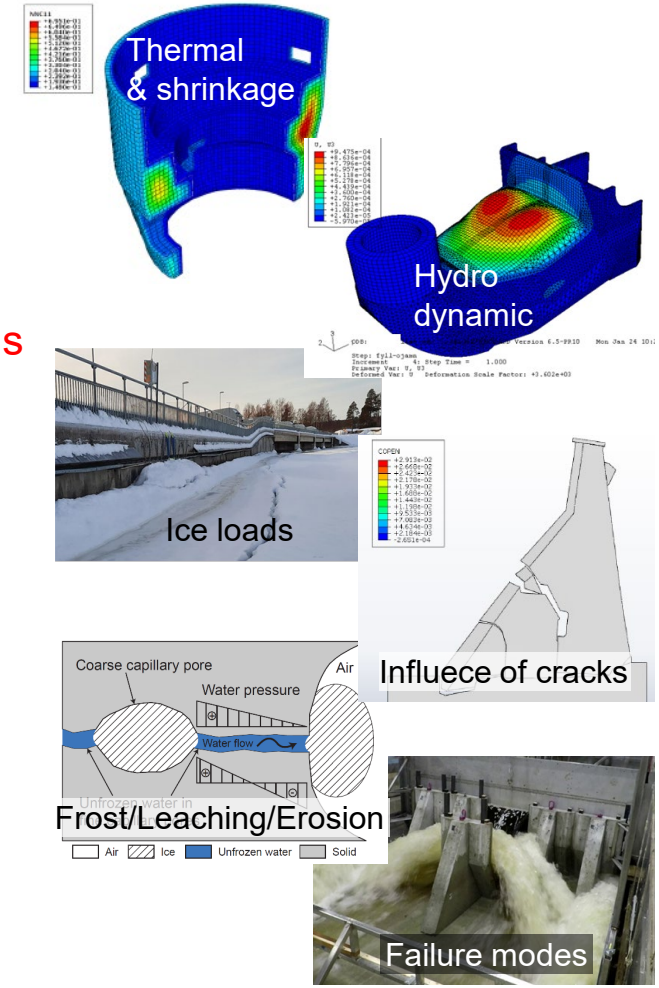
- Ageing dams – Seldom replaced
- New HPP-unit, same structure

Focus for research

- Better understanding for, and prediction of, paramount loads
- Increase knowledge of degradation mechanisms and impact on concrete properties
- More realistic assessment of concrete dam stability and design of monitoring

Loads

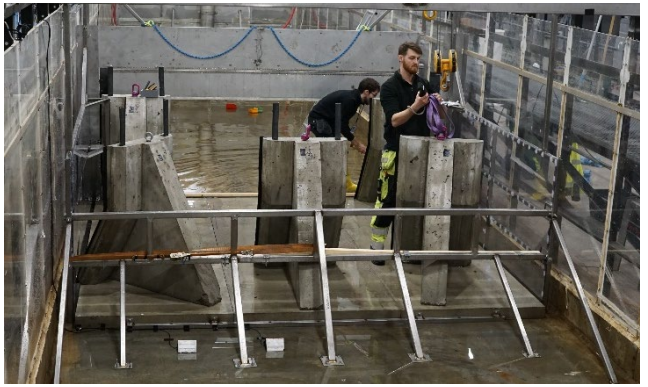
Status



Realistic failure modelling of concrete dams
(PhD-project, part II)

NEW

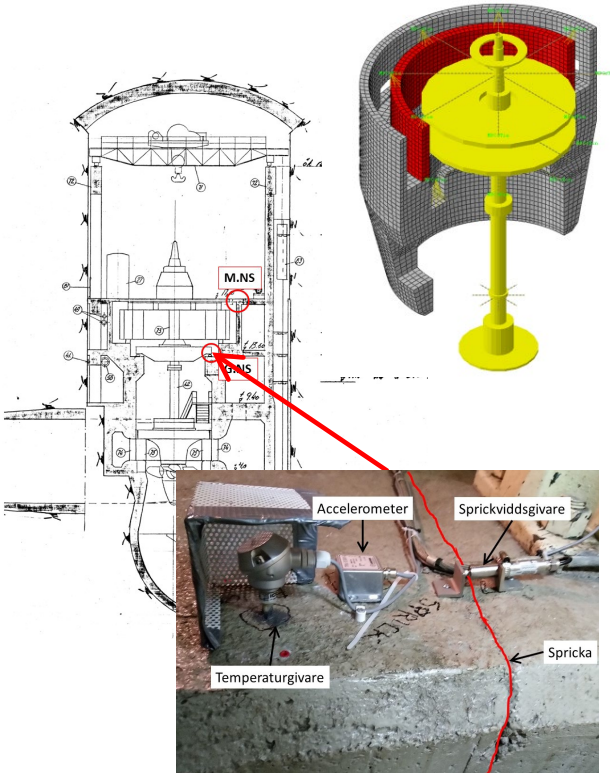
- Simplified methods for stability design in guidelines
- Uncertainties regarding failure progress and parameters of importance
- Physical model tests executed 2022 – Utilize data
- Study impact from boundary conditions
  (dam length, abutment type, joint type, cracks etc.)
- Numerical modelling – Validation
- Updated methods for assessment of stability
- Created knowledge for design of monitoring



Dynamic load and response interaction for hydropower civil structures
(PhD-project)

NEW

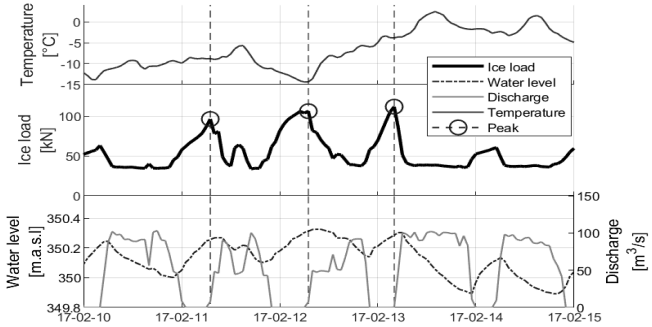
- Concrete structures exposed to several unit renewals
- Operational patterns different than during design
- Model interaction between unit and concrete structure
- Analyze impact from flexible operation
- Utilize collected data from structure and unit measurements
- Study impact from cracks (short and long-term)
- Coupled dynamic FEM + non-linear behavior of concrete
- Co-operate with PhD-student in WP3



Forecasting of ice-loads on concrete dams
(Senior project)

NEW

- Significant load - costs for stabilizing measures
- Magnitude, spatial distribution and ruling parameters unclear
- 2:nd load panel installed in Stornorrfors
- Utilize data from the sites - different boundary conditions
- Evaluate and develop drafted prediction models
- Study impact from changed reservoir operation
- Study spatial distribution of ice-load along a dam



Thanks for your attention!