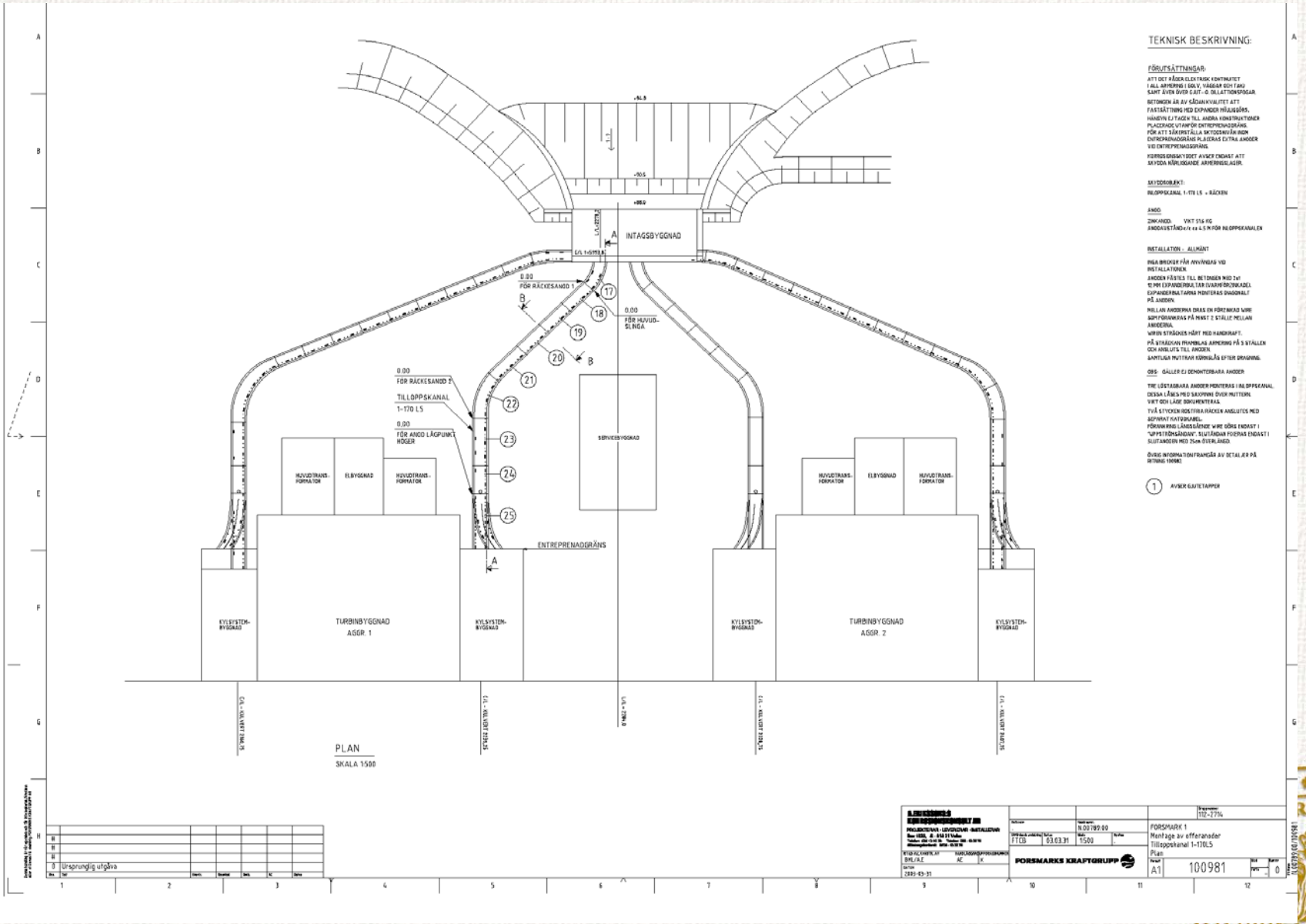
Project: EchoSound for Identifying Cracks in Nuclear Power Station Concrete Constructions

- **The project is designing a measurement device that emits mechanical waves into eg concrete. The device should be able to move by itself in unreachable and/or dangerous areas. The measuring unit to be used is shown in the picture. The waves are emitted by 12 of 24 small suspensed nozzles on the unit and received by the other 12. The unit must be lifted to be moved between the 1 cm distant measurement points and then pressed against the surface during measurement. The aim of the measurements is to draw a two- or three dimensional matrix which depicts the mechanical characteristics of the concrete and reveals cracks and deviations in the channels for cooling water in a nuclear power plant. One complication is that certain concrete surfaces in the channel are arched instead of plane.**

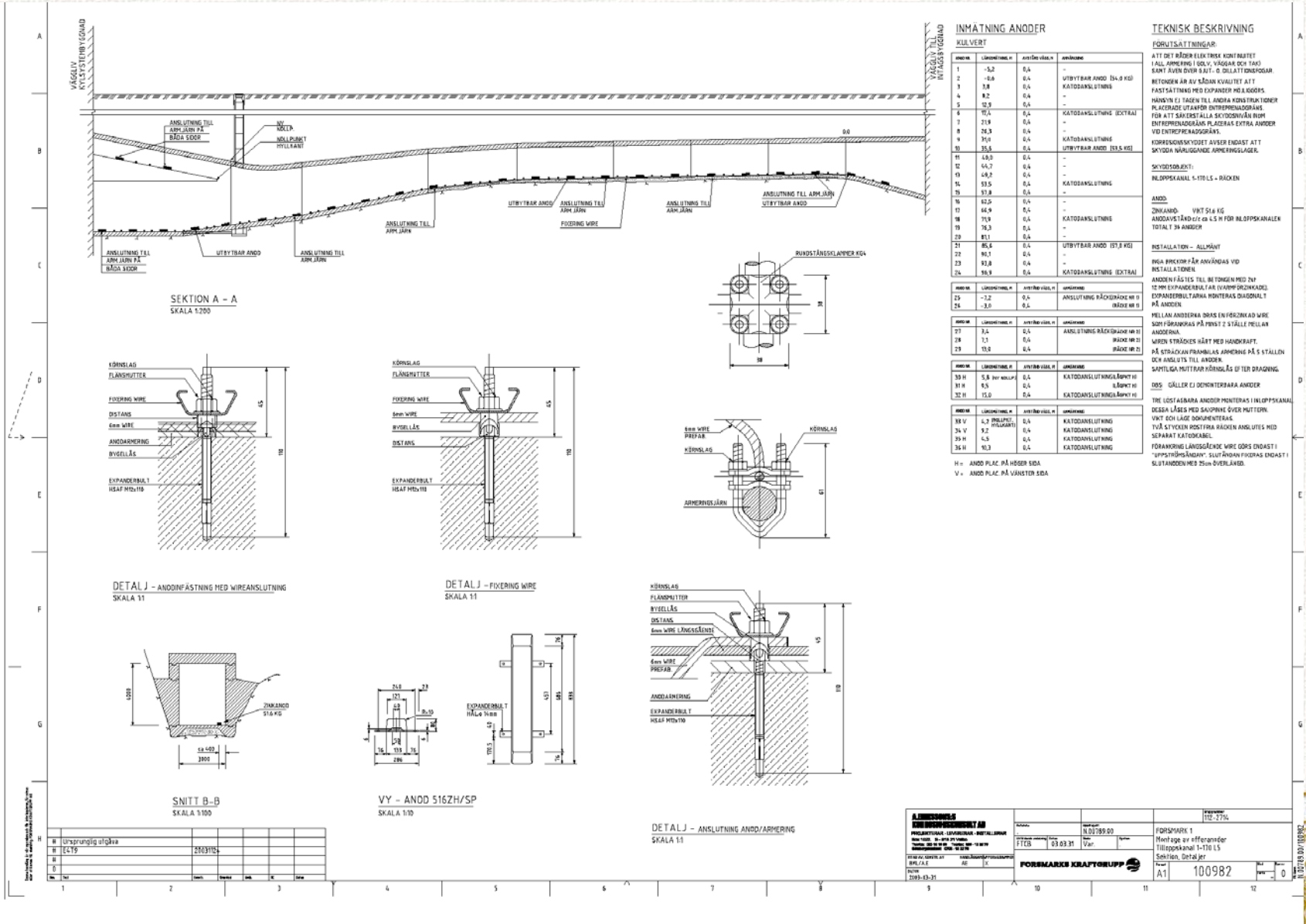
Method for the project

- **1 Project preparation**
  - Define background (motivation)
  - Set specs and delimitations
  - Specify development method, expected result, WBS, time schedule, milestones and gates.
- **2 Concept selection and design via:**
  - Brain storming, selection method, final selection, design (material, dimensions, sensors, actuators, control system, software)
- **Reports**
  - Written and oral reports.

Drawing of a nuclear plant



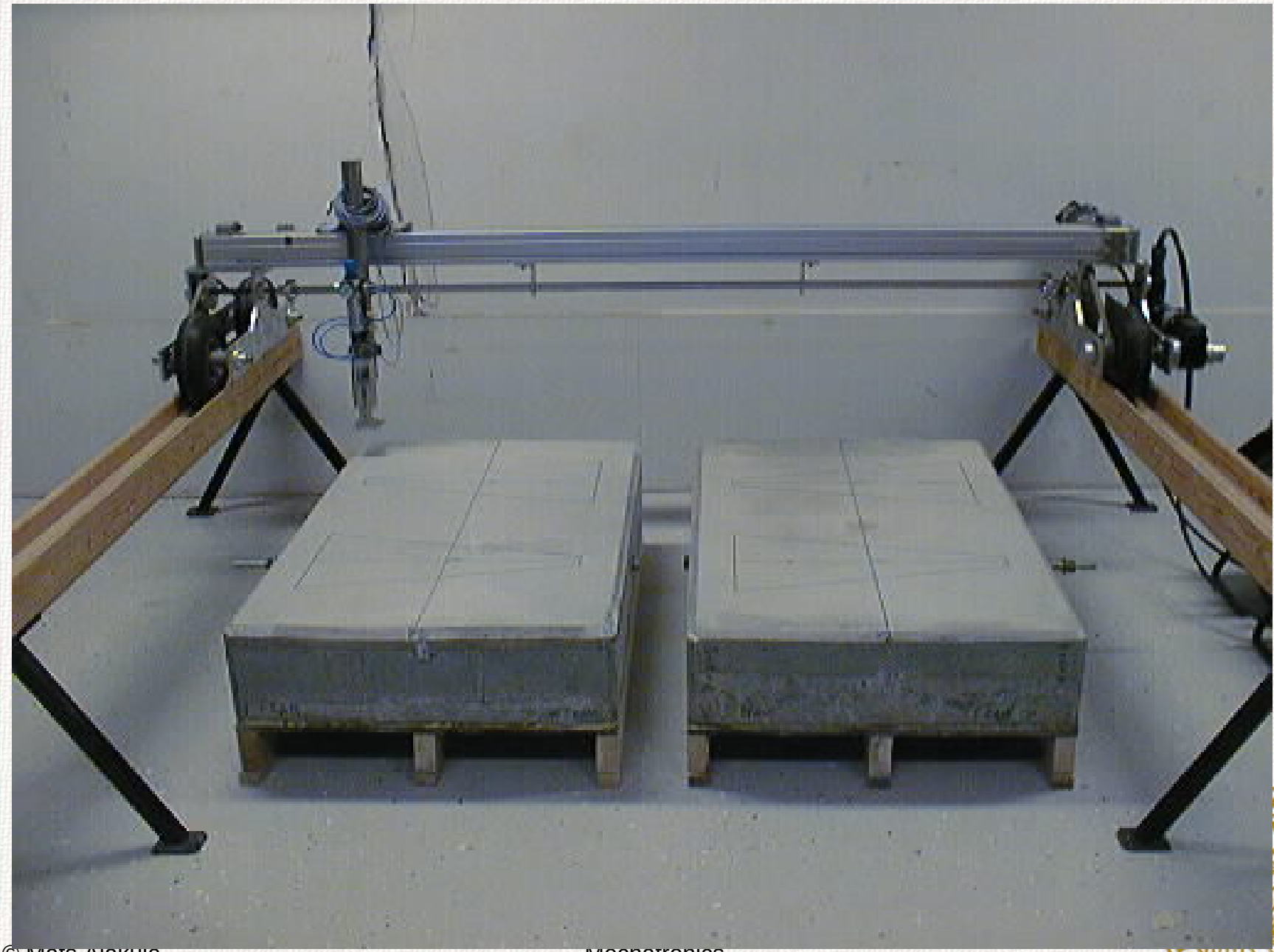
Drawing of a cooling channel in the nuclear plant

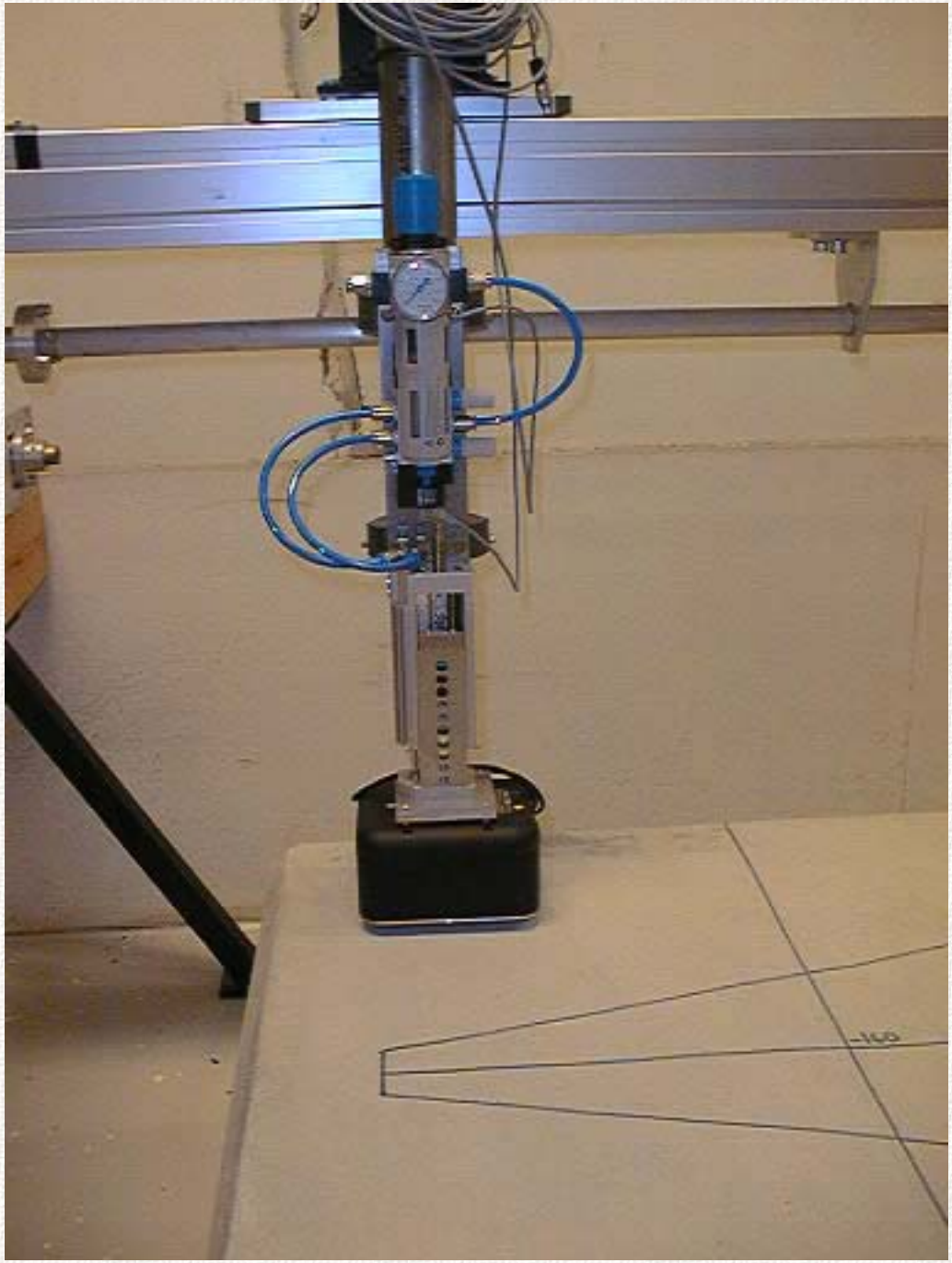


Handheld measurement unit

Nozzles for emission and detecting of waves

Automated measurement set-up in the lab





Close-up picture

Alternative measuring device

Tritech INTERNATIONAL

innovative underwater technology

www.tritech.co.uk

SeaKing Parametric SBP

Sub-Bottom Profiler

Features

- Dual frequency data
- Networkable
- Compact
- Energy efficient

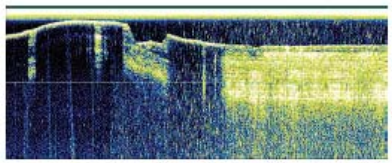
Applications

- Site survey
- Route survey
- Pipeline crossing
- Wreck search
- Object detection

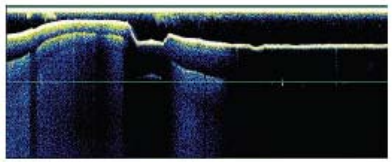
If you need to obtain a clear picture of what lies below the seabed, look no further than the SeaKing Parametric SBP from Tritech. Sub-bottom profiling is now possible from this compact, low power unit, ideal for ROV and AUV use.

An innovative multi-element composite transducer array enables the echosounder to emit very low frequencies whilst minimising the size of the overall unit. Producing a 20kHz pulse, the system is capable of penetrating the seabed and highlighting structural differences that are hidden from view to conventional echosounders.
As with all SeaKing sensors, it is possible to integrate the parametric subbottom profiler in the ArcNet network, which enables the data to be displayed and logged on the SeaNet SCU.

The display allows the operator to view the raw 200kHz seabed profile, as well as the 20kHz sub-bottom layers produced by the parametric pulse.



20kHz sub-bottom profile record



200kHz seabed profile record

the finest range of high technology subsea products in the world

Measurement unit for measuring under water

Supervisor for the project

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Reports

- **Two reports shall be submitted during the project work.**
  Implemented according to LTH's rules for technical reports.

1. Project goal and preparation (spring study period 1, Monday week 7)
   - **Background/general analysis, problem/requirement specifications/delimitation, Goal/aim/product specifications**
   - **Includes the project scheduling. Methodology, expected result (how will the result be presented?), WBS, project organization (who performs what tasks?, responsibility, rights, competence, tasks), time schedule, relation between different tasks, milestones and gates.**
   - **Reports returned with comments after one week.**
2. Product concept, choice of concept , detail construction, estimates and calculations (spring study period 2, Friday week 4)
   - **Brain storming, all possible solutions. Selection method and final concept selection.**
   - **Final design calculation, choice of material etc.**
   - **Shall contain the corrected 1'st report.**
   - **Reports returned with comments after one week.**
3. Oral presentation (spring study period 2, week 5)
   - **Oral and written report of all project groups, presentations of the project and the results.**
4. Corrected report (spring study period 2, Friday week 6)