Research Project: Automated wire cutting technology for underwater disassembling (ASTU)

Starting position

For the upgrading and decommissioning of nuclear facilities automated and remote-controlled fixtures and cutting of reinforced concrete structures are becoming increasingly important. Under this aspect, the Institute for Technology and Management in Construction (TMB) of the University of Karlsruhe in cooperation with the nuclear Siempelkamp GmbH Company developed a method, which allows to wire-cut underwater installations effectively and with minimum manpower.

From this collaboration the research project ASTU was formed, approved and funded by the Federal Ministry for Education and Research (BMBF), code number 02S8608. As an industry partner, the company's nuclear Siempelkamp GmbH and Hilti GmbH could been won over. Hilti is one of the worldwide leading companies in the field of wire-cutting technology.

Currently there is no scientific knowledge of wire cutting technology for general use. If wire saws are used, then the necessary and optimal use parameters will be determined in leading tests. This results in high costs and required time. There is no model for wire cutting technology and therefore no reliable adjustable parameters, for a optimum sawing guarantee.

As part of this scientific program the basics will be identified, and then later used to build a model of wire cutting technology.

In the 3-year project at the University of Karlsruhe a research assistant will work within the professorship “technology and management of the decommissioning of nuclear installations” under the direction of Professor Sascha Gentes at the Institute for Technology and Management in Construction.

Work program

- Concept and build of a test stand with a integrated sensor system
- Trials
- Special performance investigations
- Model building
- Flow investigations
- Corrosion behavior and water chemistry
- emission and immission behavior
- Radiation exposition by wire cut
- Optimizations and enhancements
- Final report

Goal:

From the obtained data, a model should be build that allows, for wire cut applications in various geometries and materials, clear predictions about the optimal cutting parameters. A precise statement about the cutting time, results in a increased profitability. The model is derived from various parameters given by the following basic formula:

\[ t_s = f(v_c,F_s,P,S,G,k,\ldots) \]

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