

QUALITY
INNOVATION
PROGRESS
INNOVATION
QUALITY
PROGRESS

**REMOTE CONTROLLED
WIRE SAWING APPLICATIONS**

A Company within the SWAROVSKI Group



REMOTE CONTROLLED APPLICATIONS



Diamond wire sawing is a technique with a lot of potential. Mainly the offshore and nuclear power plant markets offer numerous possibilities.

Offshore

–In many countries offshore structures need to be demolished after their useful life. This fact opens up a huge market. Cutting with diamond wires is a technique that is ideally appropriate for many applications. Regions with a high occurrence of hurricanes offer an additional business opportunity through repair and cleanup.

Nuclear power plants

–Also in this field applies the legal restraint that plants need to be demolished after their useful life. Within the next years, an opening up of a huge market can be expected in many countries.

Civil engineering

–As mainly armed concrete will be cut, these projects are similar to "normal" day-to-day activities in a cutting and drilling company. Only place and size / volume of the application are special.



REMOTE CONTROLLED APPLICATIONS



The features of remote controlled applications can not be classified by different markets. The following characteristics apply for all of them:

- No direct access to the saw during cutting work
- The operator is separated from the cutting device and often has no direct view onto the cut
- The tool life time must guarantee the performance of at least one cut
- Preparation work for the cut and positioning of the saw also have to be carried out – at least partly – in a remote controlled way
- All information that is necessary for steering the cut must be brought together in a control centre:
 - **Noises caught by the microphones**
 - **Pictures taken by the cameras**
 - **Machine data indicated by technical instruments**
 - **Communication between staff (divers, support personnel) that is secured via wireless or telephone**
- The operator needs high self confidence, trust in the cutting process and in the machines and tools he is working with (tests, project preparation)
- Remote controlled cuts are teamwork



TOPICS



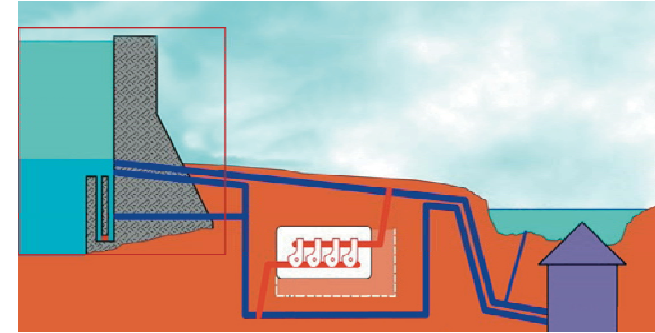
1. Case study on a dam project in Australia:
 - Preparation, development and building of the required machines and tools
 - Installation and preparation of the building site
 - Project performance
 - Learnings
2. Example from offshore applications
3. Utopia or reality?
4. Down to earth: some information for daily use



THE WARAGAMBA PROJECT, AUSTRALIA



The project was about cutting an opening in the size of 2 x 2m in a 1,8m thick concrete wall for a deepwater outlet. The cutting work was carried out 90m below sea level.



THE WARAGAMBA PROJECT, AUSTRALIA PREPARATION AND DEVELOPMENT OF MACHINES AND TOOLS



In the beginning, we face the stages of brainstorming, feasibility and tendering. There are certain risks for the involved companies. Those who do not want to take on risks should not get themselves into this kind of project.

Once the team is built and the offer placed, the project can start:

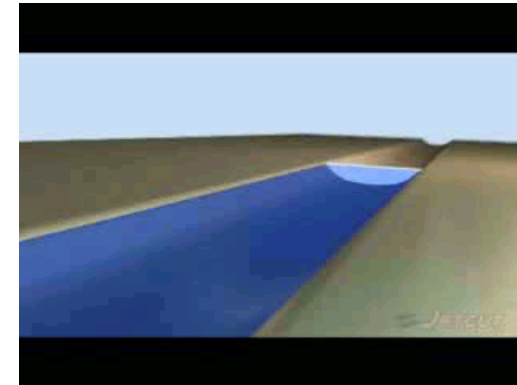
- Project organisation, responsibilities
- Detailed elaboration of procedure and equipment
- Definition of additional necessities
- Risk analyses, plan A, B and C
- Construction of the necessary equipment
- 1 to 1 test of the cutting process, necessary adaptations
- Performance



THE WARAGAMBA PROJECT, AUSTRALIA



The computer animation leads us through the project in detail:



THE WARAGAMBA PROJECT, AUSTRALIA SUMMARY



- We encountered the greatest uncertainty while doing the drilling works. The loss of a drilling segment made us drill a hole anew. Drilling performance 2cm / min.
- Wire sawing was absolutely no problem. We used a special wire without fastener. Cutting performance 1,5m in 2 / h, wire speed 15m / sec.
- The framework was convincing and the key element in this project.
- The use of special hydraulic oil proved successful. The pressure loss could be reduced to a minimum.
- Total of working time from setting up the machines and tools to lifting of the block: 14 days in a two-shift operation (12h / shift).

The project was a premiere for all involved parties. As is often the case, the devil is in the small details that show great impact towards the end of the project. Therefore, it is worthwhile to discipline oneself and to question every small detail during the preparation stage.

www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS



- As a rule, offshore applications are typical candidates for remote controlled applications. The devices and the cutting process have to be 100% reliable.
- Very often ships are used as a working platform for such operations. The costs for this infrastructure are very high. Daily rates from 200 to 800'000 US Dollar are common.
- Under these circumstances the requirements on staff and equipment are different. The method of working is uncompromisingly ruled by reliability and safety.
- These high costs for the infrastructure make the difference to the applications in the nuclear power plants. Also there time is money, however, to a different extent.
- In my view, new business opportunities for service providers are more likely in the nuclear power plant sector than in the offshore industry.

www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS HURRICANE DAMAGES



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS HURRICANE DAMAGES



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
HURRICANE DAMAGES



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
HURRICANE DAMAGES



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
INFRASTRUCTURE / EQUIPMENT



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
INFRASTRUCTURE / EQUIPMENT

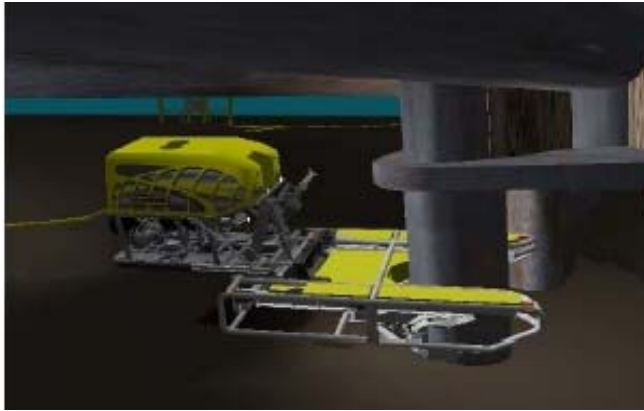


www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
ROVS (REMOTE OPERATED VEHICLES)



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS
ROVS (REMOTE OPERATED VEHICLES)



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing
Steel pipe DM 1000mm / wall thickness 32mm / compression load 422 tons



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



EXAMPLES FROM OFFSHORE APPLICATIONS

80% of the preparation work is testing
Steel pipe DM 1000mm / wall thickness 32mm / compression load 422 tons



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar



UTOPIA OR REALITY?

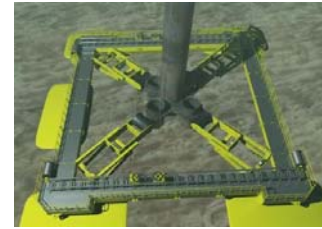


www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar

TYROLIT

UTOPIA OR REALITY?



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar

TYROLIT

UTOPIA OR REALITY?



www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar

TYROLIT

TECHNICAL SUMMARY UNDERWATER APPLICATIONS



Drilling

- Drilling is the least complicated application and works always
- Important! Always rinse with water!

Wire sawing

- If possible, always work with wire loops, this means: push the wire (this reduces the number of pulleys and reduces loss of power)
- Wire speed between 10 and 14m / sec
- The pulleys should be closed and run, if possible, in a guard
- When cutting steel the pearls have to be free of rubber and plastic

Wall sawing

- Small diameters up to 450mm are no problem
- Drive low speed when ever possible
- An all over protection filled with compressed air proved successful. The bigger the diameter, the more important (no experience with diameter \geq 1000mm)

www.tyrolit.com

FRANZ ZEINDLER | IACDS Bauma 2010 Seminar

TYROLIT

TECHNICAL SUMMARY UNDERWATER APPLICATIONS



General

- The equipment used has to be made / sealed up for the water depths
- In a depth of about 10m below sea level the hydraulic system can lose power. The water can cool down the oil and make it thick (there are special oils available for this case)
- Avoid hydraulic motors with leakage connection
- Test the operation of the machines and tools under similar conditions
- Leave the systems running in the air and under water without load. Consider the pressure gradient when operating the equipment



**THANK YOU
FOR YOUR ATTENTION!**

