



ORFEUS

Operational Radar For Every drill string
Under the Street



NewsLetter #1 • May 2013



ORFEUS TEAM

EDITORIAL

This is the first issue of ORFEUS Newsletter, a project co-financed by the European Commission, and eleven participating organisations, through the 7th Framework Programme.

The project aims to develop safe, cost effective and quick radar-guided Horizontal Directional Drilling equipment. ORFEUS dissemination material will offer you insights, views and information on key outcomes and results delivered in the project.

Horizontal Directional Drilling is a trenchless method of installing pipes and cables, of various sizes, which minimises disturbances to traffic and people living nearby. The technique is very powerful, but requires an accurate knowledge of the position of obstructions and utilities such as power cables, telecommunication lines, steel and plastic gas pipes, potable water and sewer lines, since striking one of these assets can be extremely dangerous and can cause significant economic losses if public services are interrupted. Consequently, the safe use of the technique demands an accurate knowledge of utility assets and other obstructions in the drill path. The ORFEUS drill tip radar can detect obstacles in the drilling path allowing the avoidance of damage.

in focus

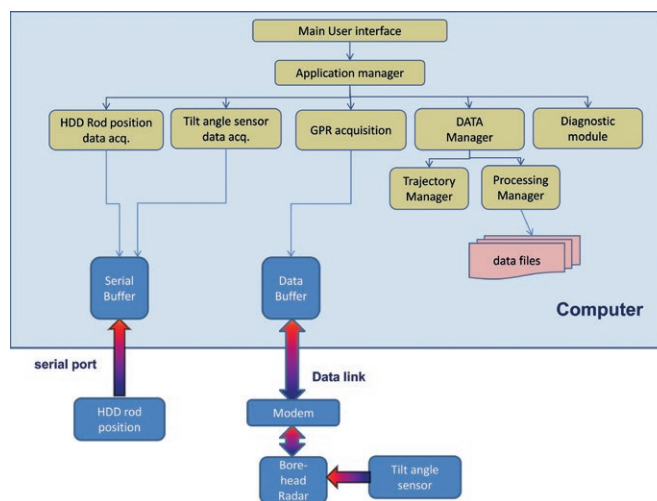
RADAR DEVELOPMENT

The European Commission 6th Framework ORFEUS project partly financed the development of a radar obstacle-detection tool installed on the steerable head of a Horizontal Directional Drilling (HDD) equipment. That research concluded by recommending that further hardware developments were necessary to make the system fully exploitable in the HDD market; these relate to antenna design (to achieve an improvement of the antenna bandwidth and beam-width to improve GPR resolution and sensitivity to targets), the development of a tilt sensor to measure continuously the rotation angle of the head, and ruggedisation of all the system components to ensure a commercially viable operational life in the extremely hostile drilling environment.

In the present EC 7th Framework ORFEUS project, several design teams are focusing activities on possible alternatives for the antenna design to that used in the previous research in order to improve the performance and to optimise manufacturing and operational costs; this requires an intensive use of electromagnetic modelling to choose amongst different options by evaluating expected characteristics in a synthetic scenario first.

A further task is the development of a data collection and processing software capable of producing output easily interpretable by the user; it includes an automatic warning system to allow the operator to avoid striking objects in the drilling trajectory.

It is expected that both hardware and software components will be ready for the integration into the operational demonstration unit by the end of 2013.



B

SOFTWARE ARCHITECTURE

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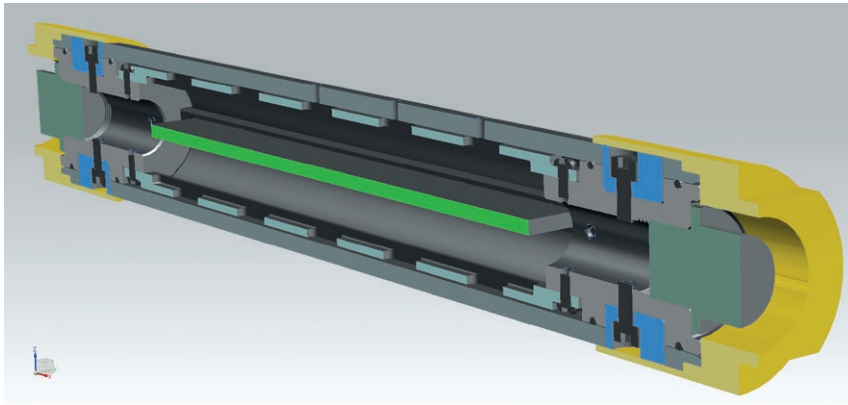
Standards workshop in DUBLIN

DRILL STRING COMMUNICATIONS

In addition to the further development of the radar head and its associated software there is a requirement to pass both power and high speed real-time data down the drill string. ORFEUS includes the design and development of this communication system, which is based on successful trials carried out in the previous ORFEUS project.

The drill string is far from an ideal transmission medium, so spread spectrum techniques are being used to ensure the integrity of the data. We are also developing signal processing electronics that will withstand the extreme shock and vibration for extended periods. At present this project effort is focused on detailed mechanical design, 3-D printing of the prototype design and producing a robust stainless steel enclosure and connector system.

Development is currently on schedule to produce an operational demonstration unit for field testing by the end of 2013.

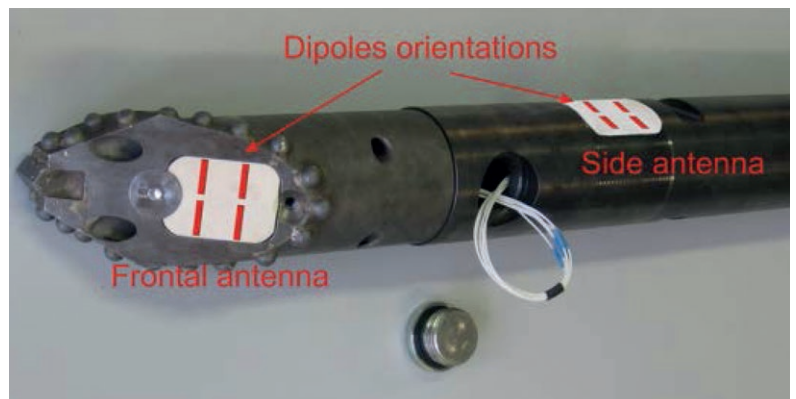


► A solid model of the ORFEUS communications and power drill-tip module
The fully sealed assembly incorporates resilient mounting systems shown in yellow.

THE PROJECT

ORFEUS aims to progress the prototype HDD bore-head radar technology that was developed under the preceding project entitled “Optimised Radar to Find Every Utility in the Street” to a commercial stage.

The project’s coordinator is OSYS Technology (UK). The consortium is consisted of Ingegneria dei Sistemi (IT), Euram Limited (UK), Engie (FR), TRACTO-TECHNIK (DE), Vilkoograd (SL), Wellington Associates (UK), EXERGIA Energy and Environment Consultants S.A. (EL), Florence Engineering (IT), Dublin City Council (IR), J&P GEO (FR). The project will be concluded in March 2015.



► Orfeus Radar Prototype

INTERVIEW - ORFEUS RADAR MARKET POTENTIAL

with Henry Stuke, head of the Beermann Bohrtechnik GmbH branch office at Zeitz, Thüringen



HENRY STUKE,
BEERMANN BOHRTECHNIK GMBH

Q1: How many bore rigs does your company own? How many employees work for your company in the trenchless field?

Our company was founded in 1947 and after initially starting off with sales of lamps and small devices, has specialised in electrical and water supply units. Since then we have 32 HDD bore rigs in action. Nowadays, the company has 350 employees in total, whereby 90 are involved in the trenchless installation field.

Q2: How is the distribution in percentage for open trench opposed to the trenchless installation technology?

There is no standard answer to this question, as there are large regional deviations. The tendency for trenchless installations is increasing though. The advantages of this method are more and more recognised by the market.

Q3: Does the compactness of all underground service lines pose a problem on trenchless installations?

It is often difficult to find a free bore path underground, which is in appropriate and secure distance to the other service lines, especially in inner-city areas. Imprecise maps of the service networks cause additional problems as well.

Q4: Which measures are currently required for the bore quality assurance and how far is this facilitated by the new radar technology inside the bore head?

Very high exploration compactness is currently necessary, which the contractors often do not see themselves. The radar technology would make lots of things easier.

Q5: Which advantages do you see in a HDD bore rig, which is equipped with the radar



DR. HANS-JOACHIM BAYER,
HEAD OF NEW TECHNOLOGIES
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technology inside the bore head?

Such a radar technology would immensely improve the quality of the work and safety of the installation, minimise damages and increase acceptance of HDD method. I am sure that the trenchless installations market will experience a big jump forward with this technology. You can be sure that a HDD bore head radar could create new application fields.

Q6: Would the new possibilities with a HDD radar bore head mean that your customers would issue more trenchless applications?

Contractors may use this technology for applications in the trenchless field, which due to boundary conditions, would have been difficult to complete. Due to the cost saving potential of this bore technology, you can assume that the number of trenchless applications would increase. Furthermore numerous intermediate pits would no longer be necessary, which would provide a quicker and friction-free bore process.

Henry Stuke, Beermann Bohrtechnik GmbH was interviewed by Dr. Hans-Joachim Bayer, head of New Technologies and Applications, Tracto-Technik

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*The company Josef Beermann GmbH & Co. KG was founded in the year 1947.
The company Beermann Bohrtechnik GmbH was founded in the year 1997 as a separate enterprise.*

ABOUT OSYS TECHNOLOGY

OSYS Technology was founded in 1996; its strengths are in Ground Penetrating Radar, Mobile and Network Information Technology, Control and Instrumentation, Electronic Engineering, especially bespoke systems for rough environments. We are the Project Coordinator for ORFEUS, and participate in the technical aspects of the project by providing the engineering expertise for the below ground data communications module, which is a key component of the system.

Early work has concentrated upon the mechanical engineering aspects of the module to produce a robust enclosure capable of interfacing to the radar system and the above ground operator module, whilst surviving the hostile shock, vibration and temperature environment. The immediate future work will aim to complete the engineering work on the electronics aspects of the module to build upon the work carried out in the first phase of ORFEUS.

Progress is on target to produce the field hardened prototype by the end of 2013.

July 3, 2013

ORFEUS is organising a standards workshop in Dublin with the aim to:

- ▶ discuss the standards that are already in place in different countries and at EU and global levels with reference to pipe laying & horizontal directional drilling, detection, radar & electromagnetic waves
- ▶ examine the draft UK Publicly Available Specification (PAS) on standards for surveying buried infrastructure
- ▶ look for gaps in the standards map that the ORFEUS technology may fill

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