Operational Radar For Every drill string Under the Street

Grant agreement no: 308356

Publically Available Standard

Deliverable 6.18

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Dissemination level		
PU	Public	☒
PP	Restricted to other programme participants (including the Commission Services)	☐
RE	Restricted to a group specified by the consortium (including the Commission Services)	☐
CO	Confidential, only for members of the consortium (including the Commission Services)	☐

Preface

This deliverable is prepared within the framework of ORFEUS project (Grant agreement no: 308356), supported by the 7th Framework Programme.
ORFEUS aims at progressing the prototype HDD bore-head radar technology that was developed under the preceding FP6 financed project entitled “Optimised Radar to Find Every Utility in the Street”.

Horizontal directional drilling (HDD) offers significant benefits for urban environments by minimising the disruption caused by street works. Use of the technique demands an accurate knowledge of underground utility assets and other obstructions in the drill path. its aims is to design a prototype innovative ground probing radar (GPR) based real-time obstacle detection system to increase the safety margins of HDD to allow its use in the widest possible range of conditions.

Extensive testing and validation, as well as supporting the demonstration and exploitation of the final product, is proposed. The crucial testing and evaluation phase will assess the risks, confirm environmental benefits and increase end users’ (public authorities and industry) confidence, awareness and uptake of this new technology. Technology transfer, training and standardisation, in cooperation with European standards organisations, will also be a significant element of the project.

Consortium

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3.		EURAM LIMITED
4.		GDF SUEZ
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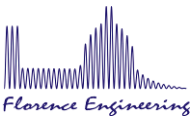
9.		FLORENCE ENGINEERING SRL
10.		DUBLIN CITY COUNCIL
11.		J & P GEO SARL

Abbreviations

PAS – Publically Available Standard

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

The ORFEUS consortium has been working with the German Standards Authority (DIN) to prepare a publically available standard associated with Horizontal Directional Drilling and the use of the ORFEUS technology.

During the last year a sub-group from the ORFEUS consortium has held a range of planning meetings and workshops to develop an appropriate PAS. Under the direction and collaboration of DIN this has now been completed and is available online. Copies of the DIN PAS are available for purchase from the DIN website.

This deliverable report includes information regarding the DIN and how to obtain a copy.

The DIN website can be found at:

http://www.din.de/

2. DIN SPEC 91322

Utility services such as water, sewer, electric, gas, telephone, cable and other services to industry, business and homes are vital to the quality of life and the economic potential of society. There are over 2 million km of underground utility services in the UK alone; and each year across the world 483 000 km of underground utilities are installed at a cost of over €31 billion. All these buried assets will need repair or replacement over time and this activity causes disruption.

The existing methods of installing, managing and repairing underground infrastructure are costly, very disruptive to the communities that they serve, have a negative impact on the environment and are poorly integrated. These problems are further compounded by a combination of lack of knowledge of what is already installed underground in a given area, difficulty in determining the precise position of such installed utilities and plant and, therefore, very real potential for damage to existing systems and a potential danger to those working in the street or living nearby.

In Germany it has been determined that the cost of damage to buried assets caused by construction work is, at least, €200 million per year. This damage was caused despite 93 % of the projects obtaining the best information possible prior to the commencement of the work. The majority of the damages were caused by excavation equipment and operator negligence.

Trenchless techniques, such as horizontal directional drilling (HDD), are currently used for less than 5 % of street works (with considerable variability from region to region), could, with greater use, deliver significant advantages in terms of cost and reductions in disruption.

The level of activity in underground excavation is already significant; a conservative estimate suggests that at the end of 2011, there were approximately 40 000 HDD rigs (of all sizes) in existence across the globe.

The advantages of the conventional HDD technique include:

- enhances operational safety compared to open cut techniques;
- reduces emissions and air pollution due to traffic congestion/accidents;
- reduces the excavation and shoring costs and consequential costs due to poor installation and reinstatement;
- reduces use of non-renewable materials (e.g. sand and gravel);
- reduces traffic and landscape disruption as less space is take by the equipment;
- protects the ecosystem and adjacent areas;
- reduces soil disturbance and collateral damage (and rework) for roads/trees/ buildings/urban and green spaces caused by the removal/replacement of spoil

from excavations;
- can drill beneath surface obstructions or ongoing site operation;
- ideal for sites sensitive to surface disruption such as railways, Tramways, Metro lines, heavy roadways, airport runways, golf courses, etc.;
- reduces the fractures to existing rock formations;
- enables a single access area to be used to install different pipes and services;
- continues to operate in different weather conditions.

It is in relation to these problems and trends that trenchless technologies, such as horizontal directional drilling (HDD) using obstacle detection equipment will have an increasing impact. It provides a solution that is reliable, cost effective, environmentally attractive and is non-disruptive. Use of HDD technology combined with GPR (or HDD-radar) offers significant benefits over conventional HDD in that it allows early detection of obstructions in the path of the drill whilst the drilling is taking place. This enables the operator to stop drilling and to plan an alternative drill path so reducing the risk of damage to other buried facilities by early identification of obstacles along the line of the drill path. The drill operator is thereby in a better position to avoid such obstacles and minimise disturbance or damage to such obstacles, be they natural (i.e. rock formations) or manmade (such as archaeological remains or utilities).

The main applications of HDD-radar include:

- installation of telecom cables (mainly fibre-optic), water mains and sewers, gas networks, district heating schemes, surface water and highway drains;
- river, street and railway crossings, and crossing of other natural or artificial obstacles; i
- installation of horizontal filter wells, of drainages or other geotechnical applications;
- power cable laying and cable replacement;

The continuous development of HDD equipment, including the incorporation of radar within the bore head, has led both to improvements in the detection of buried obstacles and to the development of the DIN SPEC 91322 which

- provides the basis for specifications for the procurement of these services to ensure a consistent quality standard in the use of HDD-radar,
- sets out the requirements, quality assurance, and testing methods and
- summarises the requirements according to today's technical standards.

To meet accepted best practice, it is necessary to implement these standards when applying HDD-radar drilling methods.

WEBLINK:

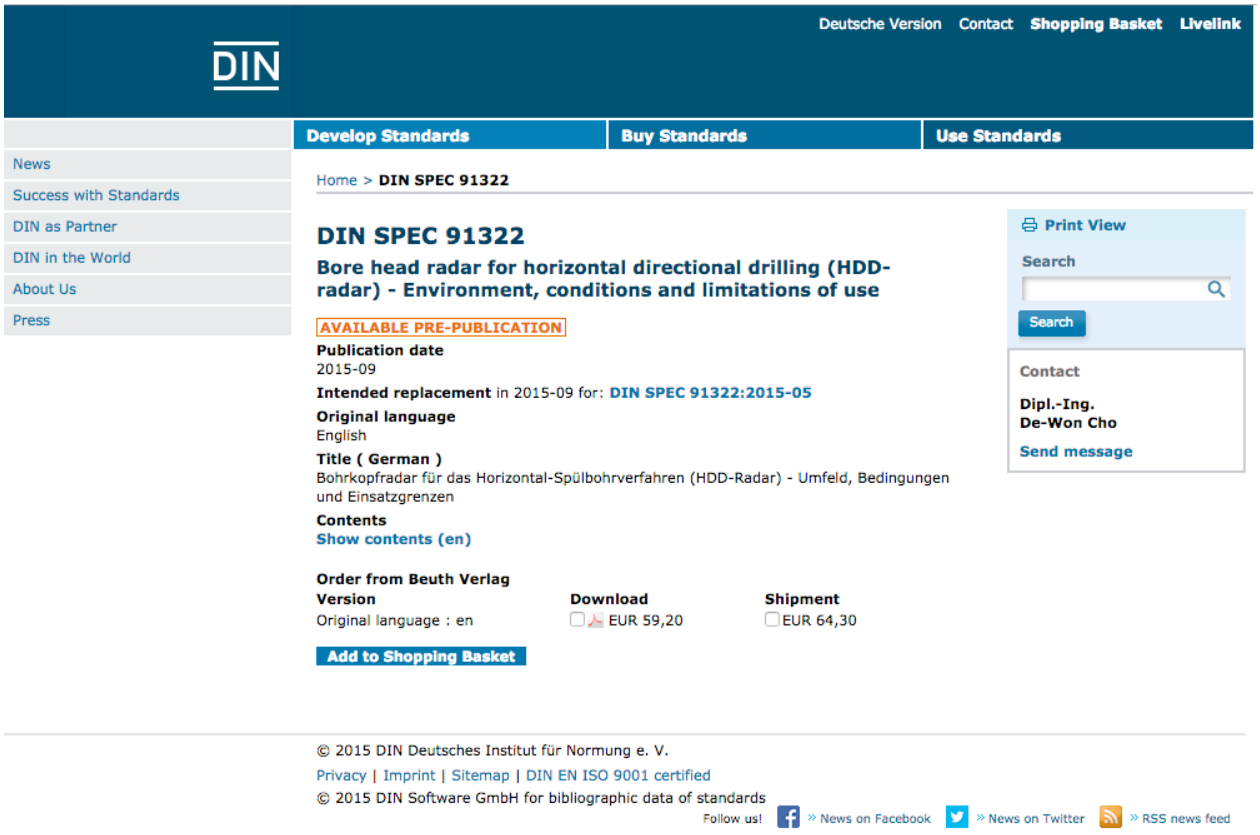
http://www.din.de/cmd?level=tpl-art-detailansicht&committeeid=0&artid=232895058&languageid=en&bcrumblevel=2&subcommitteeid=0

DIN SPEC 91322:2015-09 (E)

Bore head radar for horizontal directional drilling (HDD-radar) - Environment, conditions and limitations of use

Inhalt

Seite



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DIN SPEC 91322

Bore head radar for horizontal directional drilling (HDD-radar) - Environment, conditions and limitations of use

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Contents
Show contents (en)

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