036856 / (STREP)

Optimised Radar to Find Every Utility in the Street

Deliverable D21: Bore-Head Radar Test Report

G. Manacorda & M. Miniati, IDS

EXECUTIVE SUMMARY

This document reports on the results obtained during trial measurements executed with the Bore-head GPR in the artificial test site built in Lennestadt (Germany) at Tracto-Technik facilities. The main purpose of this phase of the project was related to the evaluation of detection performance of the system, rather than to the verification of operational functionality.

Tests were performed in two steps:

1. The system, connected to a data logger by means of an Ethernet wired link, was inserted into the artificial test site by means of a pre-prepared inspection tube. It was then manually rotated to different positions to investigate its performance in a simulated operational situation consisting of a common arrangement of pipes likely to be encountered during real drilling operations.

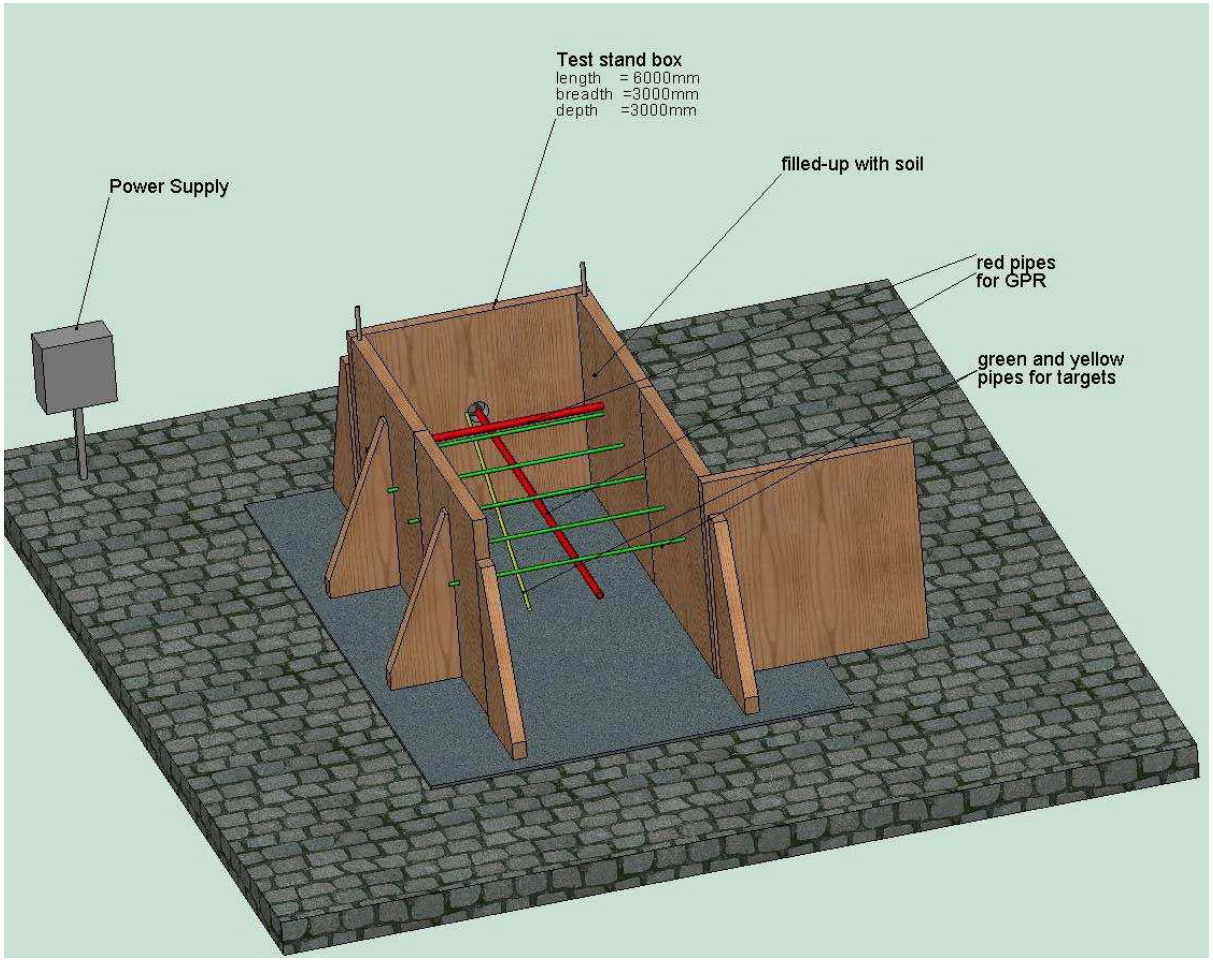
2. This test was repeated with the drilling head integrated and moved by a drilling apparatus. During this measurement, the machine drilled a new hole, parallel to the inspection pipe used during the previous test.

The artificial test site has been fully described in ORFEUS Deliverable D3; this has been established with a specific target layout, in order accurately to evaluate the performance of the system against the required specification.

All the pipes within this wooden box are non-metallic, empty, 50 mm in diameter and orientated transversally (green pipes in Fig. 3-1) or longitudinally (yellow pipe in Fig. 3-1:Sk) with respect to the bore head path (red tube in Fig. 3-1). During the tests, some of these empty pipes were filled with water or metal to make the backscattered signal stronger and enhance the visibility of the target.

As explained in ORFEUS Deliverable D14, the bore-head GPR integrates:

- a look-ahead transmitting and receiving GPR antenna hosted in the drilling head;
- a side-looking transmitting and receiving GPR antenna hosted in the drilling head housing.



During all tests, the side-looking antenna worked very well and was able to detect easily the longitudinal pipe diverging from the bore path. During the first test only, the performance of the look-ahead antenna was affected by the air gap between it and the surrounding ground. This, however, is not an operational situation for this system where the soil will be close to the bore head or even in contact with it. This was confirmed by the results of the 2nd test when the performance of the look-ahead antenna was found to be improved and the results comparable to those obtained by the side-looking antenna.

Radar measurements indicated that the position of targets in the chamber were slightly different with respect to the original design; a post-test measurement executed by Tracto-Technik determined the correct relative distances between the pipes and the bore path, to enable an accurate evaluation of the propagation velocity.

..oo0oo..