

DRAGON

AT A GLANCE

Title: Development of Resource-efficient and Advanced underGrOund techNologies

Instrument: FP7-ENV, Collaborative project

Total Cost: 4,554,771.26 €

EC Contribution: 3.243.659.00 €

Duration: 36 months

Start Date: 1/10/2012

Consortium: 7 partners from 5 different countries

Project Coordinator: Montanuniversität Leoben (AT)

Project Web Site: www.dragonproject.eu

Key Words: Excavation material; tunnelling; automated analysis; life cycle analysis; raw materials; prototypes; tunnel boring machine; zero waste; resource-efficiency



THE CHALLENGE

In the near future Europe's underground construction industry is expected to excavate around 800 million tons of mineral resources from tunnels, metros and other underground constructions like underground powerhouses, sewage tunnels etc. Currently, this excavation material is usually disposed of in landfills. Efficient re-use and recycling on site or in other industrial sectors is therefore of great economic and environmental interest. This approach would substitute a large amount of primary mineral resources and substantially reduce environmental problems and CO₂ emissions involved in landfilling and transport.

PROJECT OBJECTIVES

The DRAGON project is aimed at achieving resource efficiency in tunnelling and other underground construction processes by turning the excavation material into a valuable resource for other processes and sectors such as the cement, steel, ceramic or glass industries.

The project sets out to solve this challenge by developing a prototype system for the automated online analysis, separation and recycling of excavated materials in underground construction sites.

The entire chain from characterisation to classification and processing of the excavated material will be conducted completely underground.

The use of excavation material for various purposes is designed to save natural primary resources while also providing a high economic value.

Another important objective is to assess the resource efficiency of different usage scenarios on a quantifiable basis and thus provide a sound basis for decision making by authorities.



METHODOLOGY

Photo-optical technologies, x-ray, gamma-ray and microwave units will be used to analyse the continuous mass flow of material directly behind the cutter head. This automated online sampling and characterisation of physical, chemical and mineralogical properties provides the basis for assessing the suitability of the excavated material for different recycling options.

A downstream underground separation plant will handle the material depending on the online test results and requirements for intended re-use either as concrete aggregates on site or in various other industrial sectors. All systems will be mounted directly on the backup system of the tunnel boring machine and will thus need to be adapted to the harsh environmental conditions and space restrictions underground.

Methods of Life Cycle Assessment (LCA) and Mass Flow Analysis will be used to compare different scenarios of re-use/recycling or disposal of the excavation material.

EXPECTED RESULTS

The DRAGON project will foster sustainable domestic supply of mineral resources within the EU by maximizing the re-use and recycling of excavation materials both on site and in a wide range of industrial sectors. This approach to create valuable secondary mineral resources is estimated to generate a direct annual value of around 150 million EUR.

The automated online analysis and processing units to be developed within the DRAGON project will constitute a real breakthrough in the underground construction sector. This will help European companies to gain innovation leadership and strengthen their competitive position in this promising market.

The key environmental benefits include a substantial reduction in environmental pollution, CO2 emissions and land use for the disposal of excavation material thus approaching the aim of achieving zero waste in underground construction.

PROJECT PARTNERS	Country
Montanuniversität Leoben	AT
PORR Bau GmbH	AT
Herrenknecht AG	DE
B+G Betontechnologie + Materialbewirtschaftung AG	CH
Jacques Burdin Ingenieur Conseil	FR
PE North West Europe Limited	UK
Indutech instruments GmbH	DE

