

NEW MICROPILE DATABASE FOR WORLD WIDE USE

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ABSTRACT

One of the goals of the FIN-C2M project is to further develop the old DATU (Database on Turku Underpinning Projects) and MIDA databases (Micropile Database). As a result of this the two earlier databases have been merged creating a completely new database.

Following this merger the underpinning database can now be used for projects all around the World and lots of additional details about the projects can be entered into the micropile load test database MIDA. In total there are now details about 110 micropiling projects, almost 400 load tests and close to 9000 micropiles in the database.

The database is accessible with an internet browser and access can be given to either full set of data or to specific parts of it. Inserting data into the database can also be done with a browser. Some graphical representations from the entire dataset can be given to the public.

INTRODUCTION

FIN-C2M project at Turku University of Applied Sciences (TUAS) is part of an international cooperation C2M (Case 2 Micropile Research in ISM Collaboration) coordinated by the International Society for Micropiles (ISM). The collaboration is lead by Professore James A. Mason (University of Tennessee, USA). C2M Collaboration improves the already strong global growth and expansion of micropile markets. For a long time market growth has been 20...40 % annually and markets in the Nordic have been among the busiest in the World. On the other hand e.g. the underpinning of buildings in

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St. Petersburg have only begun and the need for underpinning exists in all old cities Copenhagen, Venice and old Dutch cities.

The new Micropile Database is a database that can store various details from micropiling projects. The core of the database is formed by the old DATU (Database on Turku Underpinning Projects) and MIDA (Micropile Database) databases. However this new Micropile Database removes many of the restrictions that these old databases had. For example DATU could handle only projects that were done in Turku, Finland and MIDA had very little details about piles outside the scope of load testing. The new Micropile Database is designed to handle all kinds of piling projects from around the world whether small or large.

DATA MODEL

Data in the new Micropile Database is stored based on the micropiling project. Each project is linked to a construction types, usually a building. Construction details include the basic details of the building, including volume, area, year of completion and location. Project details describe mainly the time span of the project. Most of the other tables are linked to the project, including contact details of companies and persons involved in the project, causes for the underpinning project, generic notes and other tasks performed during the underpinning. Also cost details and the cost of the project can be stored into the new Micropile Database. More specific details can be stored about various observations made before, during and after the project such as vibration, settlement, moisture, cracking, noise, water level and sampling hole observations. Load transfer structures, piles, load tests and soil data are inserted separately.

Load transfer structure details include the type and basic measurements of various components of the structure. The type of the load transfer structure tells the basic layout of load transfer components, whether jacks and anchors are used and in what general configuration they are used.

Soil data is stored in layers. Each layer represents a distinctive layer of soil the piles are installed into. Each site can have several columns of soil layers and each pile can be linked to a certain soil column. Soil layers are characterized by soil type and few geotechnical parameters.

VISUALIZATIONS

In the new Micropile Database there are several ways to visualize the data in the database. Some visualizations can be drawn from the entire database such as the distribution of various piling methods used during each year (Figure 1), length distribution of piles by piling method (Figure 2) or load transfer type (Figure 3) or cost analysis by for example length of piles and piling method (Figure 4).

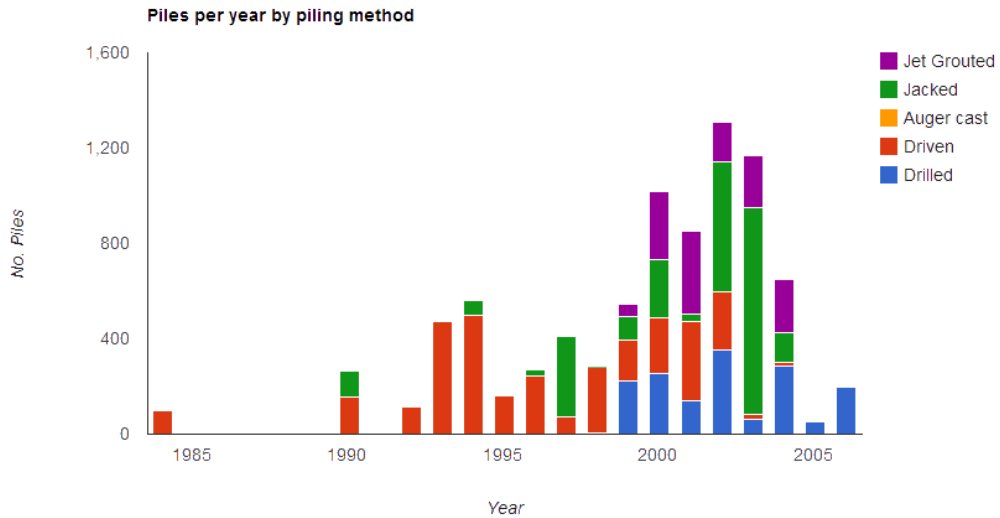


Figure 1: Piles per year by piling method.

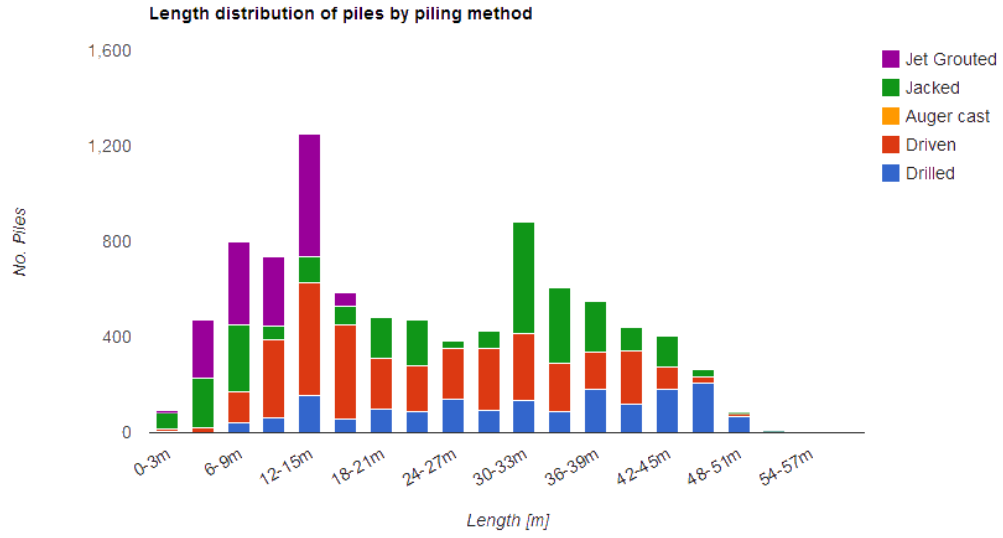


Figure 2: Length distribution of piles by piling method.

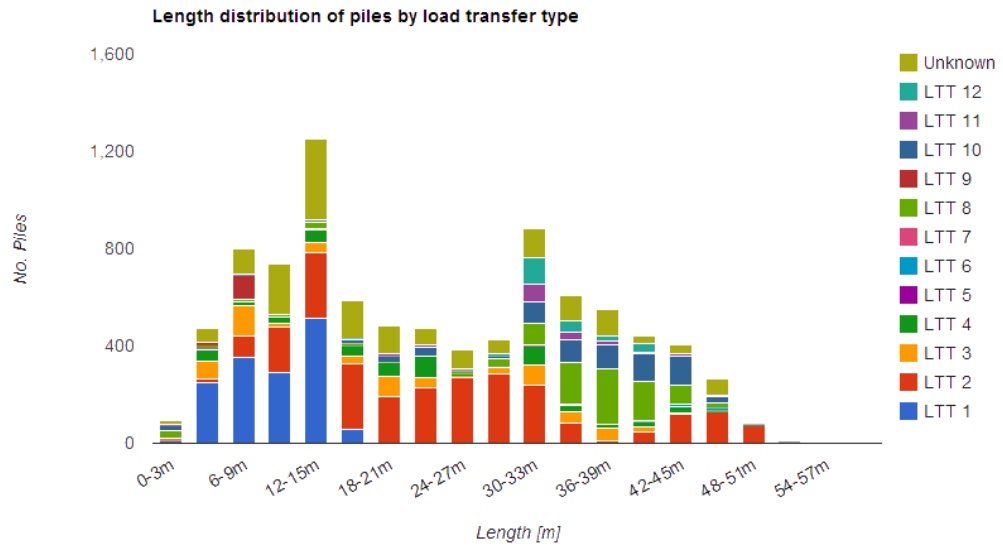


Figure 3: Length distribution of piles by load transfer type.

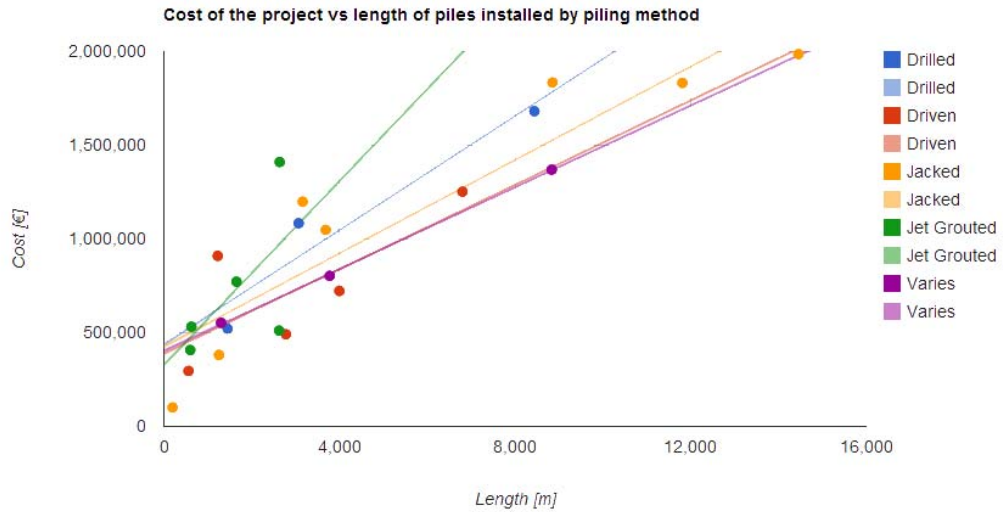


Figure 4: Cost of the project in relation to the length of piles installed grouped by piling method.

In addition to these generic visualizations there are also some more specific visualizations that are shown along the data. When viewing piles in a project a length distribution of those piles by piling method is shown (Figure 5).

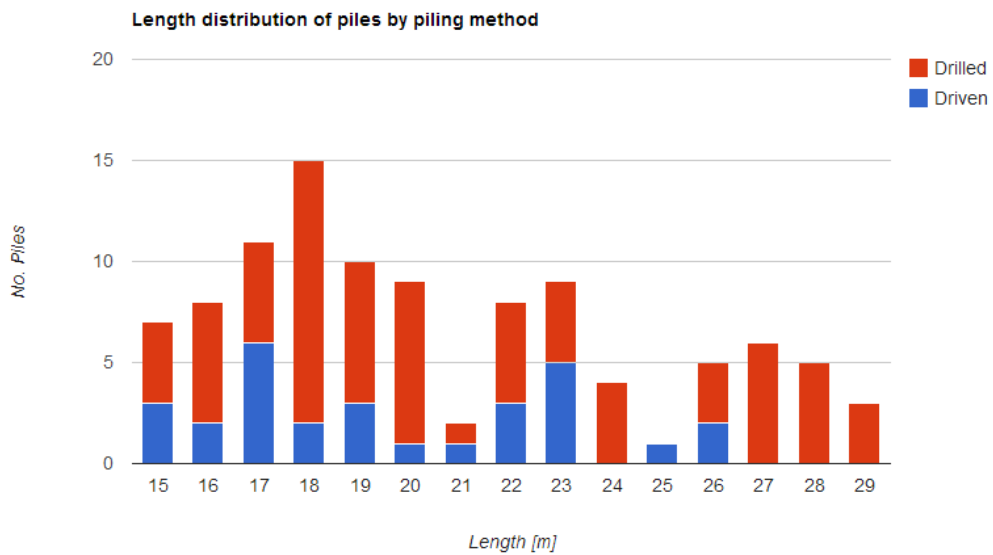


Figure 5: Length distribution of piles by piling method in a single project.

Also a cross-section image of a pile in the soil is shown when viewing pile details (Figure 6). When viewing load transfer systems a generic schematics of the load transfer types are shown as pop-up images (Figure 7).

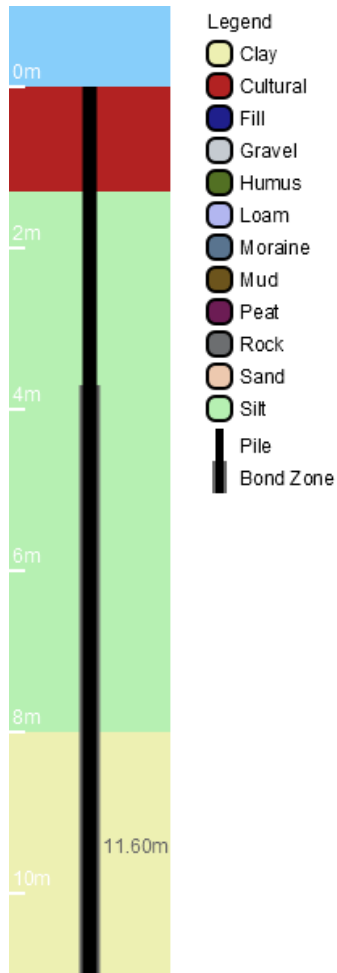


Figure 6: Cross section of pile within a soil column.

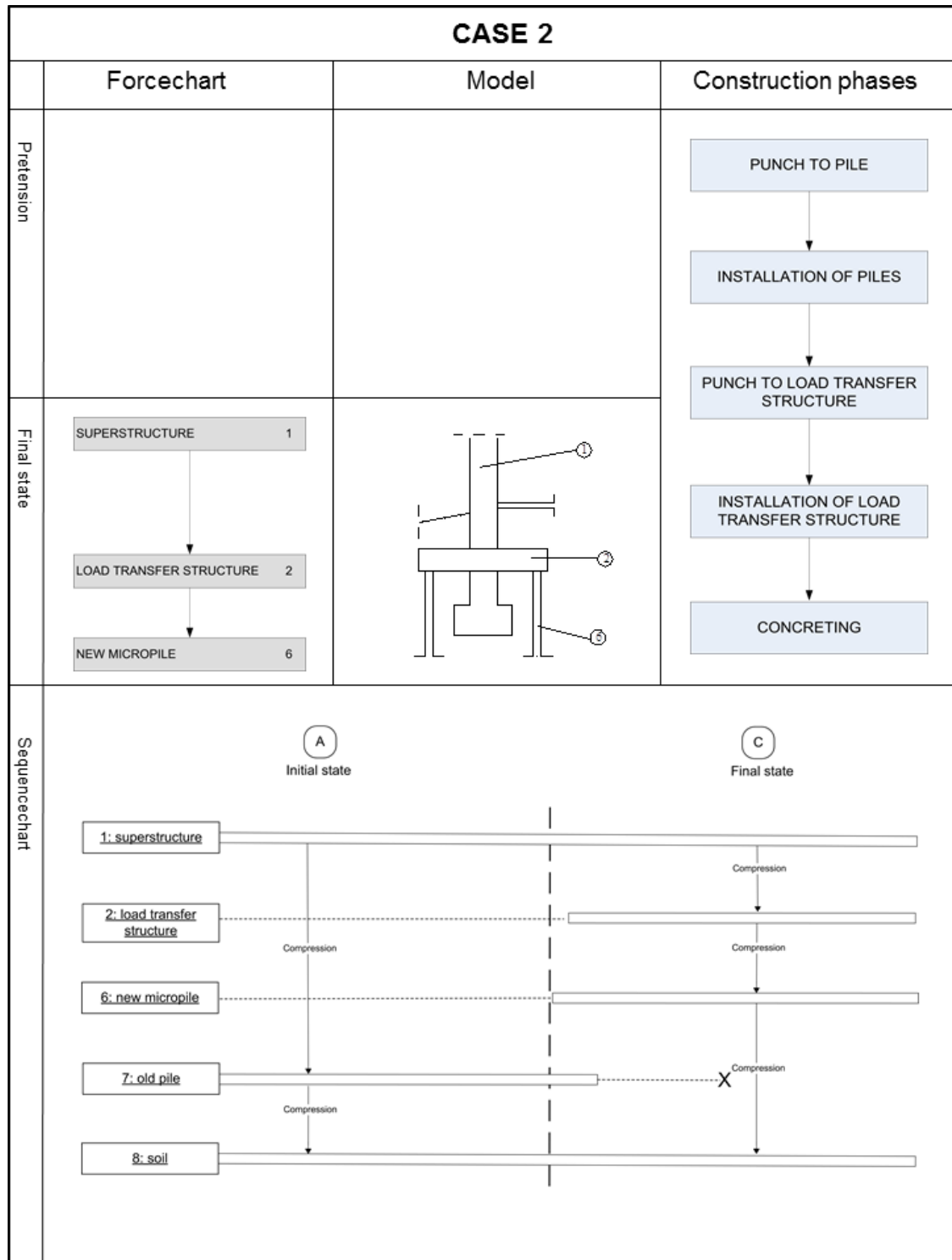


Figure 7: Generic schematics of a load transfer structure type shown in a popup window.

CONCLUSIONS

As a result of the new Micropile Database, an invaluable tool for analyzing micropiling projects will be available. The database could be used for analyzing various details in micropiling projects and their effects e.g. on load bearing capacity or costs. The data available in the database has already been used to analyze the cost of underpinning projects (Lehtonen & Kiiras, 2010)

REFERENCES

Lehtonen, J.L., and Kiiras, J.M. (2010). *Cost modelling in underpinning projects*. Construction Management and Economics, vol 28, no 9, 985-995 pp.