NEW MICROPILE DATABASE
FOR WORLD WIDE USE

Jussi Hattara & Ville Hyyppä
BACKGROUND

- More than 200 underpinning projects in Turku
- One of the largest underpinning projects complexes in the world
- There are several major cities – e.g. St. Petersburg, Copenhagen, Amsterdam and Venice – that have either started or are in need of underpinning old buildings
- One of the goals of the FIN-C2M project is to further develop the old DATU (Database on Turku Underpinning Project) and MIDA (Micropile Databases)
- The first micropile database (DATU) was developed in TUAS (Turku University of Applied Sciences) in 2006.
- Completely new micropile database
  - Internet address: www.micropile.fi
INTRODUCTION

- Database includes
  - about 110 different micropiling projects
  - almost 400 load tests and
  - close to 9000 micropiles
- Can store various details from micropiling projects
- The core of the database is formed by the old DATU and MIDA
- Accessible and inserting data with an internet browser
- The new Micropile Database is designed to handle all kinds of piling projects from around the world
- The data already in the database and additional data collected from new underpinning projects
DATA MODEL (1/2)

- Data is stored based on the type of micropiling projects
- Each project is linked to a construction types
- Construction details include the basic details of the
  - building, volume, area, year of completion, location
- Include also cost details and the cost of the project, various observations made before, during and after, such as
  - vibration, settlement, moisture, cracking, noise, water level and sampling hole observations
- 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
Soil data is stored in layers

- Each site can have several columns on soil layers
- Each pile can be linked to a certain soil column
- Soil layers are characterized by soil type and few geotechnical parameters
  - soil type, elevations and undrained shear strength
Several ways to visualize the data in database

Some visualizations can be drawn from the entire database such as the distribution of various piling methods used during each year.
VISUALIZATION (2/3)

- Length distribution of piles by piling method
VISUALIZATION (3/3)

- Length distribution of piles by load transfer type
LOAD TRANSFER SYSTEMS

When viewing load transfer systems a generic schematics of the load transfer types are shown as pop-up images.

Case 3 in this case.

<table>
<thead>
<tr>
<th>Forcechart</th>
<th>Model</th>
<th>Construction phases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUPERSTRUCTURE 1</td>
<td></td>
<td>PUNCH TO PILE</td>
</tr>
<tr>
<td>JACK 3</td>
<td></td>
<td>INSTALLATION OF PILE</td>
</tr>
<tr>
<td>LOAD TRANSFER STRUCTURE 4</td>
<td></td>
<td>PUNCH TO LOAD TRANSFER STRUCTURE</td>
</tr>
<tr>
<td>NEW MICROPILE 6</td>
<td></td>
<td>INSTALLATION OF LOAD TRANSFER STRUCTURE</td>
</tr>
<tr>
<td>Final state</td>
<td></td>
<td>JACKING</td>
</tr>
<tr>
<td>SUPERSTRUCTURE 1</td>
<td></td>
<td>BLOCKING OF LOAD TRANSFER STRUCTURE</td>
</tr>
<tr>
<td>LOAD TRANSFER STRUCTURE 4</td>
<td></td>
<td>CONCRETING</td>
</tr>
<tr>
<td>NEW MICROPILE 6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MORE SPECIFIC VISUALIZATION (1/3)

- Cost analysis by for example length of piles and piling method
MORE SPECIFIC VISUALIZATION (2/3)

- Length distribution of piles by piling method in a single project
MORE SPECIFIC VISUALIZATION (3/3)

- Total 8960 piles shown in two different charts
HOW TO REGISTER AND USE THE DATABASE?

1. To register on the site
   - go to the front page: www.micropile.fi/
   - choose your language
2. Click on the Create an account link
   - close to the bottom of the page
3. Fill in the form and press Register button
4. To activate your account, you will need to open the activation link sent to your e-mail address in a browser
IN CONCLUSION

- 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.
- For example, researchers, teachers and students can analyze the differences between the undeppinng projects or even micropiles.
- The number of project and data will increase in the future.
- The data available in the database has already been used to analyze the cost of underpinning projects by Lehtonen & Kiiras.
THANK YOU!

"The more information, the better the database!" 😊