

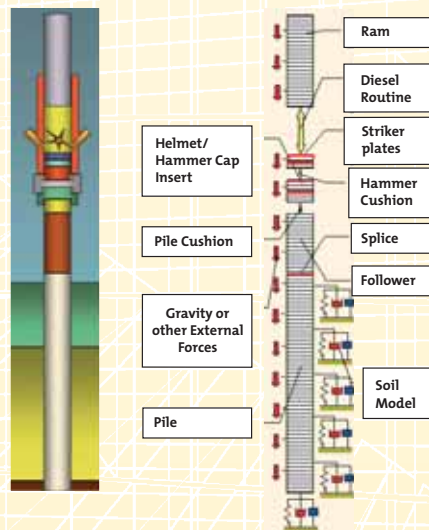
# TNOWAVE

## Wave Equation Program

### TNOWAVE Wave Equation Program

TNOWAVE represents a group of wave equation application programs and is a powerful simulation tool to predict pile behavior. The TNOWAVE application is suitable for simulating pile-soil interaction under dynamic conditions. TNOWAVE is based on the one dimensional stress wave theory and allows the modeling of:

- All types of impact hammers, anvils and cushions, vibratory hammers and devices like Statnamic
- Piles with cross sectional variations and cracks
- Tubular steel piles, open ended or closed
- Shaft friction and toe resistance



### Principle of TNOWAVE

The TNOWAVE algorithm is based on the Method of Characteristics. A pile is divided into elements, which may have different cross sections. The forces caused by shaft friction are assumed to be concentrated at the boundaries of the elements. For each element between the set boundaries an analytical solution for the wave equation is valid. The TNOWAVE algorithm has been proven to be very stable and accurate.

### TNOWAVE Applications

TNOWAVE has the following application modules:

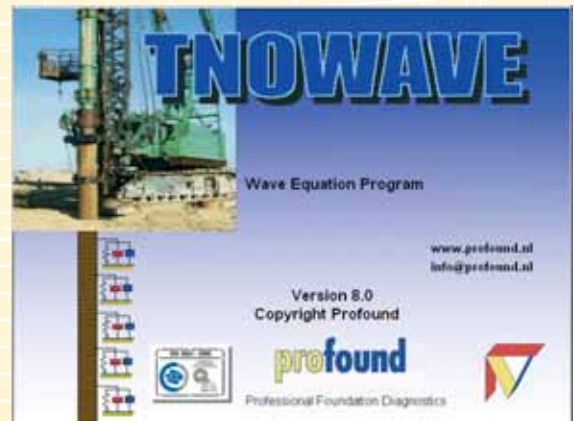
- PDPWAVE for Impact Hammer and Vibratory Hammer driveability studies
- SITWAVE to determine local pile defects from Sonic Integrity Testing signals by signal matching
- DLTWAVE to determine pile capacity from a Dynamic Load Test by signal matching
- STNWAVE to simulate soil and pile behavior conducting a Statnamic Load Test

### User interface TNOWAVE

The program is a powerful, yet user-friendly program. It includes an electronic manual and extensive Help functions (incl. practical examples to assist the user).

All TNOWAVE modules are designed for professional geotechnical engineers as well as technical practitioners to make pile behavior predictions and simulations. All dimensions and parameters are expressed in engineering units (SI or English).

The advantage of the new user interface is that the design is kept simple and logical for any user. The program has three application levels.



Opening screen TNOWAVE

### Simple

In this case the program sets default values and many actions are performed automatically.

### Intermediate

The user has access to the fundamental parameters of the program and can apply his/her own experience.

### Advanced

The advanced option allows for maximum flexibility and is intended for experienced users, giving them access to a multitude of input parameters and programming options.

For the intermediate and advanced levels it is advised to follow a training course.

# TNOWAVE

## Wave Equation Program

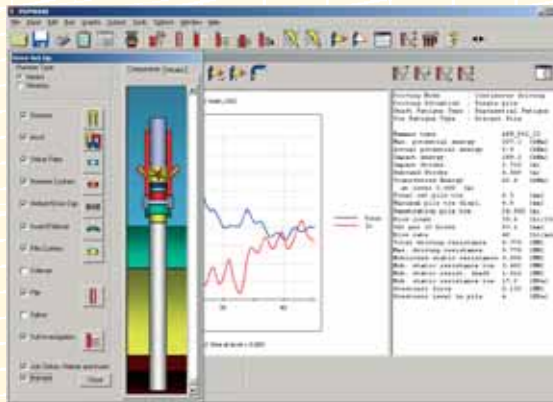


### Short description TNOWAVE Modules

#### *PDPWAVE for impact hammer Pile Driving Prediction*

PDPWAVE simulates the pile driving process for many combinations of pile driving hammers (either impact or vibratory), cushions, pile types, and soil conditions. With the results of PDPWAVE the piling engineer can:

- Perform driveability studies
- Optimize the selection of the hammer
- Select the maximum energy level without damaging the pile
- Increase the efficiency of the pile driving set-up
- Predict compression and tensile stresses in the pile



*PDPWAVE user interface*

#### *SITWAVE pile modeling from Sonic Integrity Testing signals*

SITWAVE is used to determine the dimensions and location of pile defects from SIT signals. In SITWAVE the user builds a model of the pile and the soil to simulate Sonic Integrity Testing. The measured and simulated signals are then compared, and the model parameters automatically adjusted until a good match is obtained.

#### *DLTWAVE signal matching for Dynamic Load Testing (DLT)*

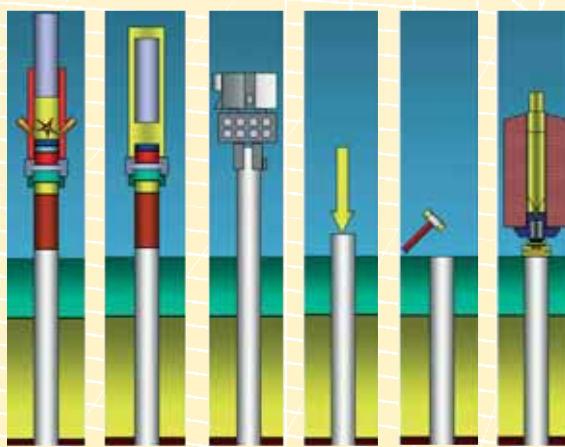
DLTWAVE simulates the dynamic load test obtained with the signals of a PDA/DLT monitoring system. The pile and soil are modeled. In an automatic interactive way soil model parameters are adjusted, and measured and calculated signals are matched to determine the capacity and the static load displacement behavior of the pile from the DLT test results.

#### *STNWAVE simulation of a Statnamic Load Test*

By modeling the fuel burning process, the reaction mass, the launching height, the soil and pile parameters during a Statnamic test the mobilized pile capacity under set soil and pile conditions can be predicted. Load - displacement behavior of piles undergoing Statnamic Testing can be modeled.

### Advantages of TNOWAVE applications

- Accurate prediction results from the method of characteristics algorithm (eliminating potential numerical instability which may be experienced with other discrete lumped mass based models)
- Large variation of input options for hammer, pile and soil selection
- User interface designed for using geotechnical parameters
- Soil input with digitizing option for CPT, SPT, Cu, DMT, PMT and Soil Laboratory results
- Soil data input with GEF files (Geotechnical Exchange File)
- Multiple soil fatigue models
- Extensive graphical options for processing of prediction results
- Very user-friendly users interface



PDPWAVE PDPWAVE PDPWAVE DLTWAVE SITWAVE STNWAVE

### Profound services

TNOWAVE applications are licensed and provided with a protection key. TNOWAVE demonstration programs and support and maintenance contracts are available. This secures the users of software updates on a regular basis.

Profound provides instruction courses and user seminars. Our local agents around the world, who speak your language and understand your needs, are also ready to assist you whenever requested.

### For further information:

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