

# Estimation of soil parameters in depth of borehole, based on SPT data

**Program:** NovoSPT

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## 1. Introduction

This example illustrates the use of "SPT Correlations Software (NovoSPT)" to calculate the variation of engineering soil parameters in depth of a borehole, which can be used for:

- Analysis of bearing capacity of piles;
- Analysis of lateral deformation of piles (e.g. LPILE input data);
- Slope stability analysis;
- Liquefaction analysis; etc.

## 2. Input Data

The main input data of NovoSPT program includes soil stratigraphy and SPT blow counts. You can either enter such data manually or you may load it from text files, Excel files, Access databases, gINT files, etc.

In this example user imports SPT data from a gINT file using Novo Tech SmartSync tool. By choosing File►Import►from gINT menu and selecting the target gINT file, SmartSync dialog will appear which lists all the existing boreholes, and plots SPT blow counts versus depth:

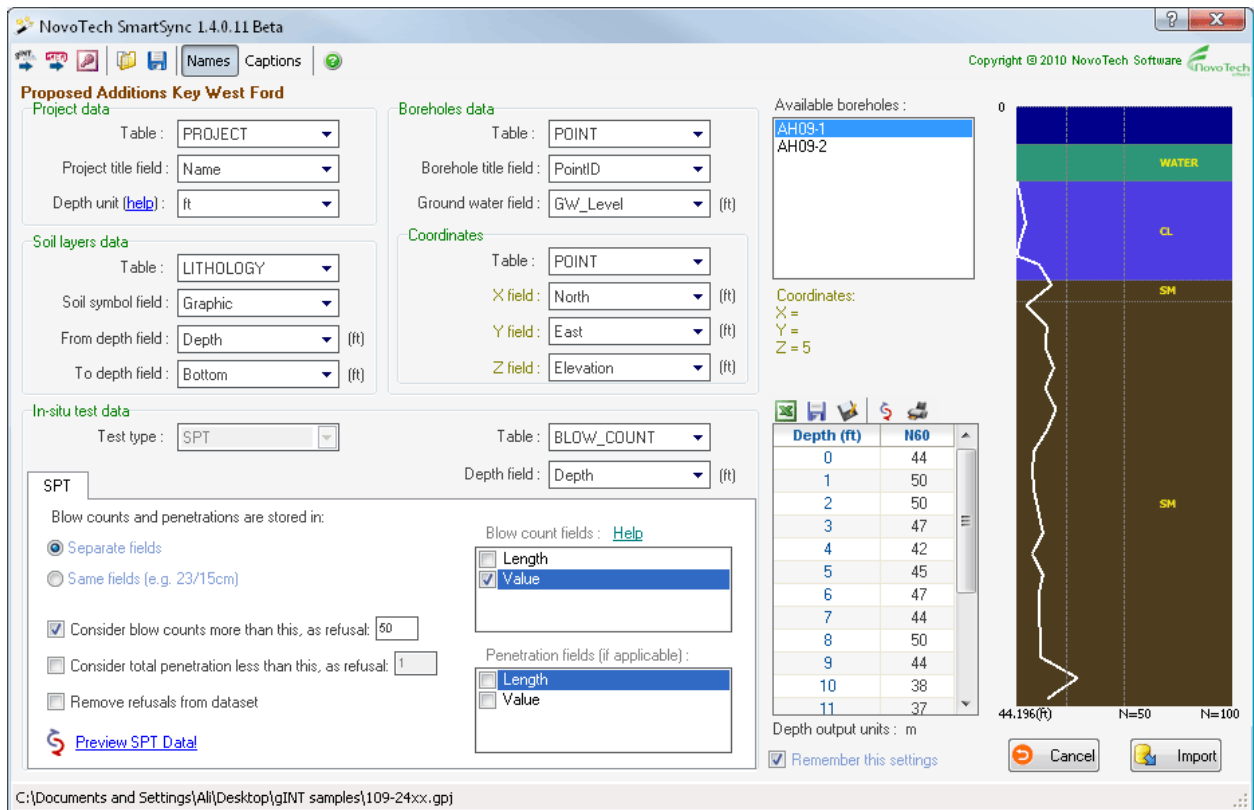


Figure 1: SmartSync tool, loading gINT data directly into NovoSPT for further analysis.

From within SmartSync tool, data can be easily saved as Excel file (data), image file (plot) or even printed. By clicking on **Import** button, soil stratigraphy and SPT blow counts will be transferred to NovoSPT input tables.

If you don't use gINT for drafting your logs, you can manually enter input data into the tables:

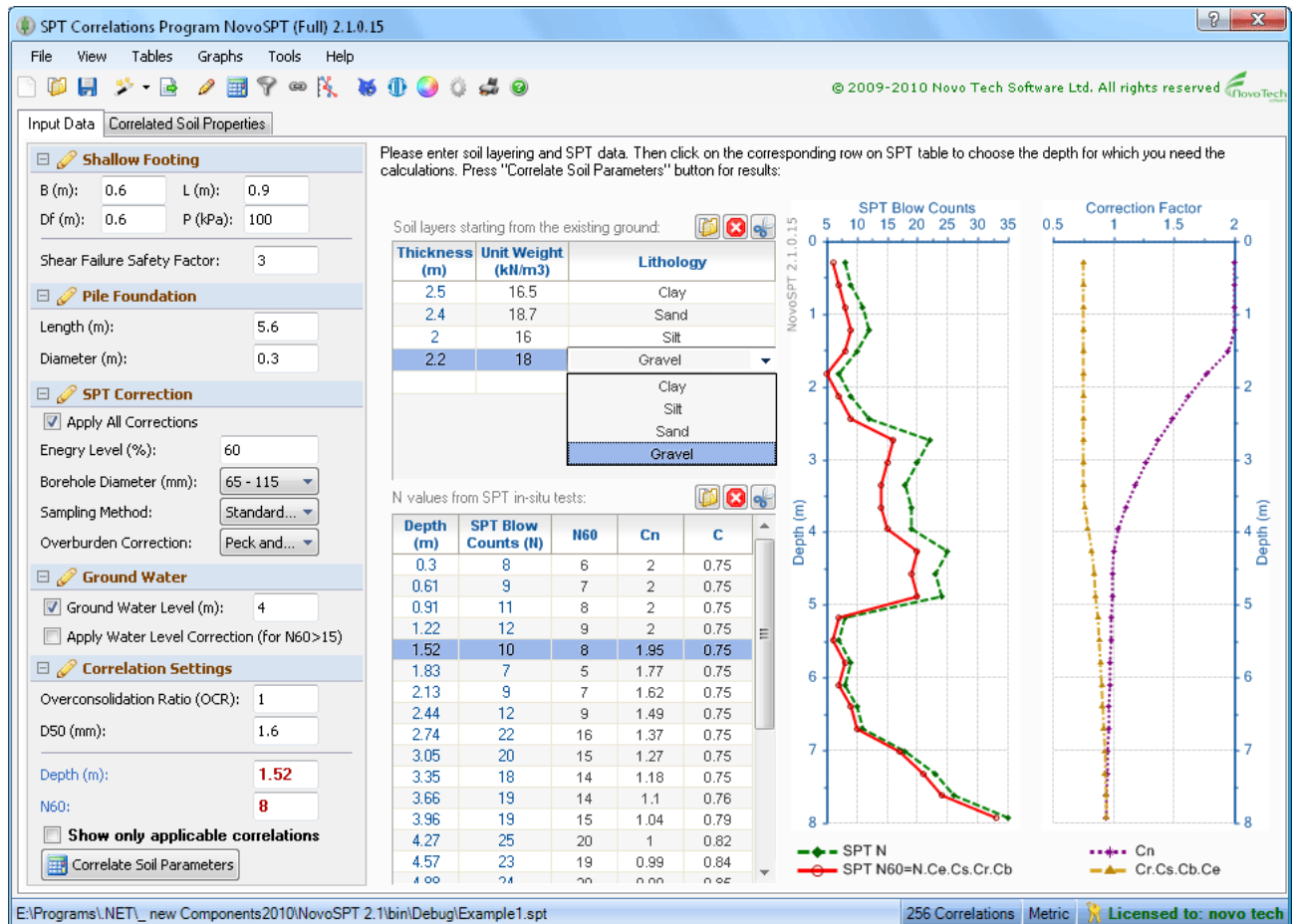


Figure 2: Input form for NovoSPT software.

### 3. Soil Type Filter

NovoSPT has a variety of settings that help user identifying the problem and obtaining the reliable values for specific soil parameters. One of the new features in NovoSPT allows the user to filter the correlations based on soil type. When user selects simplified soil type for each layer (Clay, Silt, Sand, Gravel), NovoSPT can filter the correlations and provide only those applicable to that specific soil type.

In order to activate soil type filter, "Show only applicable correlations" checkbox should be selected. If this checkbox is not selected, all correlations regardless of whether they are valid for each soil type, will be listed in the output table.

### 4. Analysis

To obtain soil the correlated parameters at a specific depth, first click on desired depth and then press "Correlate Soil Parameters" button. More than 270 correlations for different soil parameters will be readily available in "Correlated soil properties" tab.

Objective of this example is to show how to generate the distribution of a specific soil parameter in depth of a borehole, based on SPT blow counts data.

Let's assume that we need shear wave velocity ( $V_s$ ) in depth of the borehole. To do this, click on "Depth Correlation" button. This will show the following dialog. On soil parameters list, select "shear wave velocity" and choose all the correlation methods you want to be plotted versus depth of borehole (this is a good feature for comparing the correlation methods). Then click on "Plot Selected Methods" button to refresh the plot. As it can be seen on the following screenshot, several correlations are provided for each layer. For example for top Clay layer, the following methods are plotted:

- JRA 1980 (for clays) : olive line
- Imai 1977 (for clays) : green line
- Iyisan (for all soils) : gray line

In this case, JRA 1980 correlation provides higher values for  $V_s$  whereas the other two methods are reasonably consistent. User may remove JRA 1980 method and add other available correlations for clayey soil and compare them to the existing methods before making the final decision on estimated  $V_s$  for this layer.

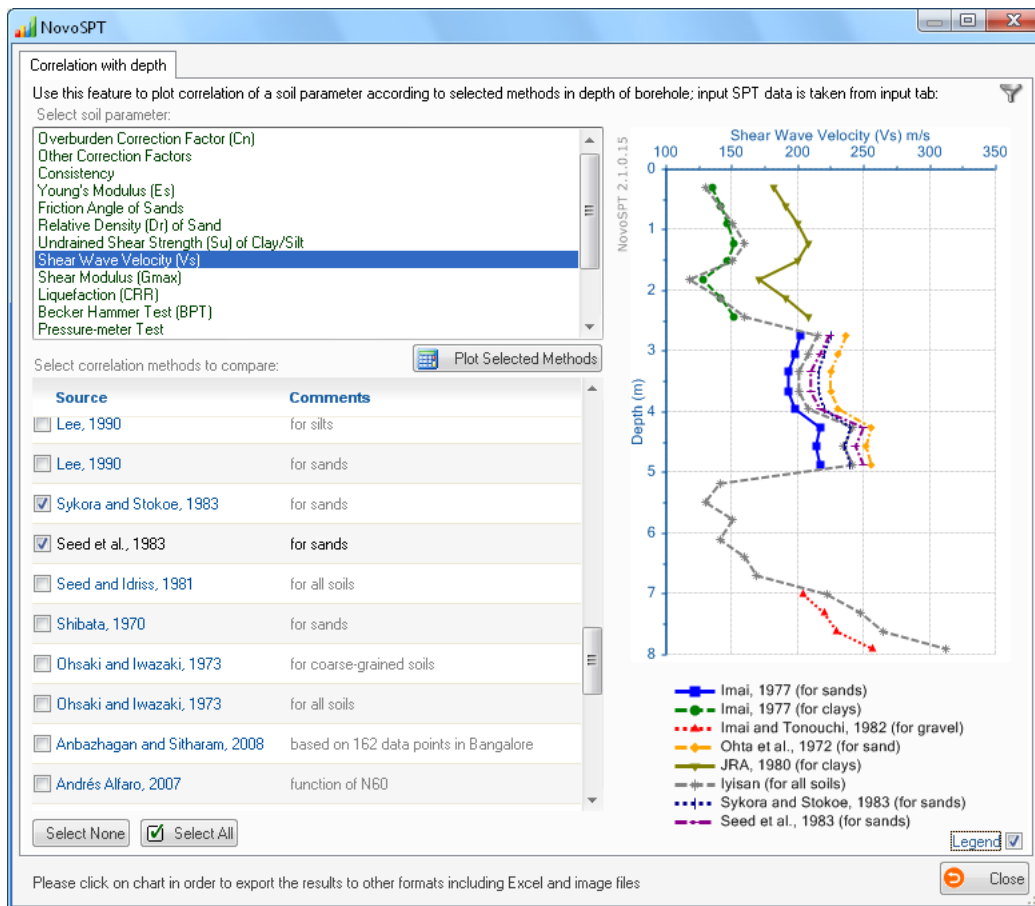


Figure 3: Correlation of shear wave velocity with depth of the borehole.

### 5. Exporting The Output

Now you may need to save this correlated dataset as Text or Excel files and use it in another application. Click on graph and when new dialog appears, click on Excel icon

from toolbar. Specify the name and path of the file and press OK button to save the file.

Graphs can be exported as image format and dataset may be saved as Text, XML, etc. and any further analysis can be easily carried out on this dataset.