

Pad foundation, EN 1997-1

esafd.02.01 Pad foundation, EN 1997-1

Pad foundations are used to support single columns, spreading the load to the ground below. They are generally square or rectangular in plan, with the plan area being determined by the permissible bearing strength of the soil. The shape in plan is enforced by the arrangement of the columns and the load to be transferred to the soil.

This functionality in Scia Engineer enables the user to perform a stability check of pad foundations in accordance with EC-EN 1997-1.



Datasheet Scia Engineer

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The support type Pad foundation (previously called 'Foundation block') extends a wide set of support types in Scia Engineer. From now on, besides the stiffness which is taken into account under the structure, it is also possible to check the stability of the pad foundation according to EN 1997-1: Geotechnical design-Part 1: General rules, 2004.

Three separate checks can be executed:

- Bearing resistance check;
- Sliding resistance check;
- Eccentricity check.

Furthermore, the AutoDesign tool is introduced to optimize the dimensions of the pad foundation. It is possible to input the maximum stress received from a geotechnical report and use this value for the automatic design.

The pad foundation properties are defined by:

- Pad foundation geometry;
- Subsoil properties.

Design and optimization tools are available for single or multiple selected pad foundations as well as in the Overall AutoDesign for optimization of all pad foundations in the model.

Geotechnical combinations

Set B and set C of the EN-ULS (STR/GEO) combination defined in EN 1990 are available for the foundation check.

For the check a result class GEO is automatically created. This class contains all combinations of types: EN-ULS (STR/GEO) Set B and EN-ULS (STR/GEO) Set C. The latter is specifically used for Geotechnical Design according to Design Approach 1.

Pad foundation input

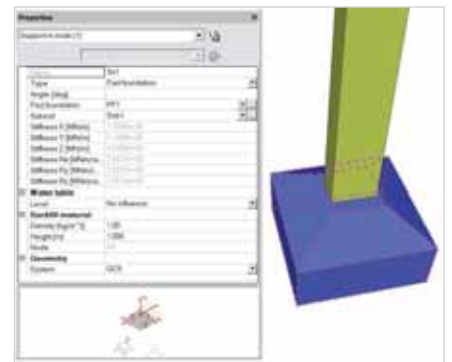
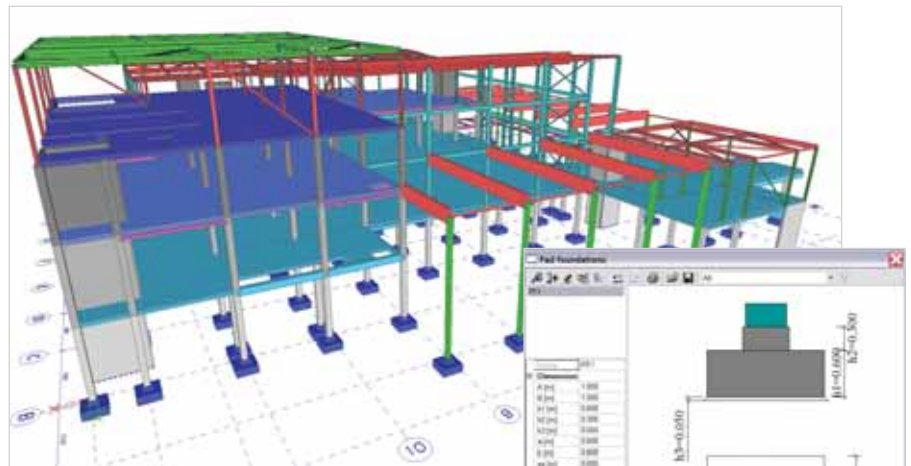
Easy-to-use Pad foundation dialog is used for input of geometry and other properties of pad foundations.

Moreover, the subsoil library is linked to the pad foundation properties.

Pad foundation stability check

In general, three separate checks are executed:

- A Bearing resistance check is executed according to art.6.5.2 and Annex D of EN 1997-1. The vertical design loading V_d should be equal or smaller than the bearing resistance R_d .
- A Sliding resistance check is executed according to art. 6.5.3 of EN 1997-1. The horizontal design loading H_d should be equal or smaller than the sum of the sliding resistance R_d and the positive effect of the earth pressure at the side of the foundation $R_{p,d}$.



- An Eccentricity check is executed according to art.6.5.4 of EN 1997-1: special precautions are required for loads with large eccentricities.

When executing the check, the safety and resistance factors which are applied depend on one of the 3 design approaches chosen in the geotechnics setup.

AutoDesign

An optimization tool for pad foundations is also available. This enables the user to search easily for an optimal geometry of the foundation block. The user can choose any of the pad foundation dimensions or even optimize several parameters in one step. This is called sensitivity optimization: it verifies the sensitivity of different parameters to the check.

The maximum check limit is configurable for each of the three main checks.

Highlights

NEW

- ▶ Both the stability check and the autodesign of pad foundations have an optimal performance speed.
- ▶ User is able to check both the superstructure as the foundations.
- ▶ Optimization tool: the AutoDesign of pad foundations can be carried out in a fast way. The user is able to optimize one or more dimensions of the pad foundation. With the sensitivity optimization, several parameters can be optimized together. Scia Engineer will give as final result a pad foundation with the most optimal geometry dimensions.
- ▶ The AutoDesign of Pad foundations can be performed together with the AutoDesign of structures.
- ▶ A detailed output with input data, results and used articles is available. This output can be sent to the document for the final report.
- ▶ A unity check can be performed: this gives as result the most critical value of the three checks. This prevents that the user has to perform each check separately.