RTwalls
11.10.361 RTwalls START (Initial Package)
11.10.358 RTwalls EXPERT (Expert Package)

Retaining Walls incl. Wall Design

- Geotechnical verifications according to DIN incl. EAU & EAB as well as EN 1997 and corresponding national annexes for DE & AT
- Sheet Pile, Soldier Pile, Bored Pile or Slotted Walls as Cantilever, Single-span and Multi-span Girders
- Wall dimensioning according to EN 1992/1993 with NAs for DE, AT & CZ/SK for reinforcing steel & GFK reinforcement
- Economical verifications with individual load combinations for each design situation/limit state
- Clear working environment with templates for parameter models
- Completely graphic-oriented input with optimal control of all changes
- Comprehensive result output with free configuration of results and graphics

RTwalls is RIB’s geotechnical program for the analysis and design of retaining walls. With a basic and full version RTwalls allows the processing of simple and complex tasks and has a configurable working environment for input, design and evaluation. All results are displayed tabularly for all construction phases in a clear and verifiable form with graphics.

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RTwalls EXPERT for retaining walls

RTWALLS-BASIS is the basic program for the calculation and design of retaining walls with a graphically interactive work environment for input, calculation and evaluation. The program application supports the following calculation and design options:

- Modern interface with ribbon bar, quick access bar, tree view & property grids as well as 2D and 3D views
- Clear tabular display and editing of all objects with result preview
- Direct import of data from the previous version
- Clear program control, configuration and independent language settings DE, EN and CZ for input and output
- Geotechnical verification according to DIN 1054 incl. EAU and EAB as well as EN 1997 and corresponding NAs for DE, AT & CZ
- consideration of damage consequence classes (CC) for the ground failure analysis according to ÖNORM B 1997-1-1
- adjustable polygonal ground level including a ground and soil database with berms on the valley and soil sides as well as free soil horizon arrangement on both sides of the retaining wall
- optional input of vertical dimensions by height above datum
- consideration of up to 5 horizontal soil horizons
- vertical sheet, soldier pile, bore pile or diaphragm wall
- efficient framework calculation with finite elements for the consideration of bending with normal force as well as shear deformations during wall calculation
- inserts for a maximum of 5 outriggers or anchors
Product Information

- cantilever, single- and multi-span girders of arbitrary base-point bearing
- consideration of different excavation states and retreating construction states
- line, block, triangular, trapezoidal and strip loads as well as DB-loads (railroad loads) on the ground level in the soil profile on the mountain side as well as block and strip loads in the soil profile on the excavation side for each construction state
- Variable approach of different at-rest earth pressure coefficients
- Calculation of at-rest earth pressure for block loads according to the half-space method
- deformations given by the user or transferred from preliminarily calculated phases
- evaluation of stress resultants, anchoring forces and deformations
- evaluation of the support forces and the required embedment depths
- evaluation of earth pressure from dead load / surcharge under active, increased active earth pressure and earth pressure at rest
- different forms of earth pressure redistribution according to the German guidelines EAB and EAU as well as arbitrary earth pressure redistributions according to the user's own pre-settings
- special redistribution of blocked area loads
- hydrostatic coverage of water levels in front of and behind the wall
- variation of the water level behind the wall per excavation phase
- retention forces for different base-point bearings
- use of degrees of fixation of the wall for the optimization of the wall length
- consideration of continuous bedding with realistic bedding stresses
- verification for sum of vertical forces
- evaluation of the required anchor lengths from the stability analysis of the deep slide joint
- slope stability according to Bishop (friction circle method)
- various straight and curved slip line approaches for earth resistance
- integrated friction circle and anchorage analyses
- Design of the bracing as single or multi-span girders with / without a cantilever for all common I- and U-sections according to DIN 18800 or EN1993 - where applicable with stability analyses
- Anchor design as stranded, single or system anchor (ANP-Systems, Dywidag-Systems, Atlas Copco, Anchors of Schroeder, Ischebeck, Stahlwerk Annahütte or user-defined) with distinction between temporary and permanent anchors
- Overview of the verifications with details of the utilization rates
- Clear result output with geometry of the retaining wall for each construction state as short list, long list and detailed list
- Pre-selection of the results or free visual configuration of the result list
- System overview as plot with earth layer, component and design information

The output of text and graphics is performed with RTreport for the respective static system in each construction state; for the earth pressures with and without redistributions, for the stress resultants and deformation distributions as well as for the anchor length definitions and the friction circle analysis. Being a geotechnical application, enhancement for RTwalls offers the following advantages in particular:

- Clear and efficient user interface with support for parameterized inputs
- Completely graphic-oriented input with ideal control of all changes
- Use of templates as well as quick familiarization with the introductory example
- Simple calculation and design of various wall systems with anchors or supports
- Clear and consistent result output with pre-selection for graphics

Extension to full version for retaining walls

This program extension to the full version of RTwalls removes the restrictions of the basic version of RTwalls, so that the program application supports the following additional input, calculation and design options for retaining walls:

- arbitrary amount of polygonal soil horizons
- arbitrary amount of anchors and outriggers
- Dimensioning of stepped wall sections
- consideration of bedding adaptation
- Dimensioning of stepped wall sections
Product Information

- Approach of the foundation modulus method according to EB 102
- single- or multi-span, prestressed and elastic anchorages, inclined or horizontal
- alternative approach for active earth pressure according to Culmann and for earth resistance according to Gudehus
- additional presetting of earth pressures and earth resistances
- evaluation of water levels under flow pressure as parallel flow
- analysis of hydraulic base failure
- coverage of water levels as designed water storey
- additional presetting of hydrostatic pressures, e.g. for the description of complex water ratios
- earthquake design with separate consideration of loads for selected construction states according to EN 1998 Part 1 + 5 including Appendix E for the requirements of retaining walls

The output of text and graphics is performed with RTreport for the respective static system in each construction state; for the earth pressures with and without redistributions, for the stress resultants and deformation distributions as well as for the anchor length definitions and the friction circle analysis. Being a geotechnical application, enhancement for RTwalls offers the following advantages in particular:

- unlimited application for arbitrary retaining wall systems
- efficient calculation and design of various wall systems with any anchors or supports
- design as stepped wall in combination with different wall types
- clear and consistent output of results for complex retaining wall systems

Load combinations for retaining walls

With this program extension of RTwalls, the application of full loading with a distinction of the design actions for permanent, variable and accidental loads can be converted to a free combination formation:

- User-defined or automatic combination for arbitrarily selected structural states and limit states
- Use of load case attributes for the application of specified partial safety factors and combination coefficients for continuously and variably acting loads considering also leading and accompanying actions
- Use of user-defined partial safety factors and combination coefficients for all load cases

Differentiation between full load related or free combination formation

Option of taking a permanent, temporary, exceptional or temporary-exceptional design situation into account

Automatic or targeted consideration of the various limit states GEO-2/3, EQU, STR, UPL and HYD

Output of the decisive load combinations for each check

Design as sheet pile wall

With this program module, sheet pile walls can be designed with all relevant proofs. All input parameters can be specified for this wall type in an integrated program environment. Together with the geotechnical analyses of the basic module and the design components for other wall types this module can be combined for an integrated calculation, design and evaluation of the wall:

- Wall design according to DIN 18800 or EN 1993 1 with corresponding NAs for DE, AT & CZ
- Profile database with all common sheet piles of the manufacturers ARBED, HOESCH, LARSSSEN
- Consideration of the design approaches for sheet piling according to EAU/EAB
- Load capacity verification for bending, transverse and normal force
- Consideration of shear and web buckling or buckling
- Proof for injection of sheet pile locks

The output of the special design results of the sheet pile wall takes place in a continuous result output with graphics by RTreport for the entire static system and for each construction state of the wall. The design component supplements the overall solution with the following advantages:
Product Information

- Clear and efficient user interface with specific entries for sheet pile walls
- Continuous verification for sheet piles with configurable output scope
- Combined design as stepped wall in combination with the full version and other wall types

**Design as soldier pile wall**

With this program module, soldier pile walls can be designed with all relevant proofs. All input parameters can be specified for this wall type in an integrated program environment. Together with the geotechnical analyses of the basic module and the design components for other wall types this module can be combined for an integrated calculation, design and evaluation of the wall:

- Design of soldier pile according to DIN 18800 or EN 1993-1, respectively, DIN 1052 or EN 1995 as well as corresponding NAs for DE, AT & CZ
- Profile database with all common I and 2*U profiles
- Consideration of the design approaches for soldier pile walls according to EAU/EAB
- Load capacity verification of steel girders for bending, transverse and normal forces
- Consideration of buckling, flexural buckling and torsional flexural buckling of the steel girders
- Dimensioning of the infill according to DIN 1045, DIN 1045-1 or EN 1992-1, respectively, DIN 1052 or EN 1995 as well as corresponding NAs for DE, AT & CZ, if necessary with arch verification
- The output of the special design results of the soldier pile wall takes place in a continuous result output with graphics by RTRreport for the entire static system and for each construction state of the wall. The design component supplements the overall solution with the following advantages:
  - Clear and efficient user interface with specific entries for soldier pile walls
  - Continuous verification for sheet piles with configurable output scope
  - Combined design as stepped wall in combination with the full version and other wall types

**Design as bored pile wall**

With this program module, bored pile walls can be designed with all relevant proofs. All input parameters can be specified for this wall type in an integrated program environment. Together with the geotechnical analyses of the basic module and the design components for other wall types this module can be combined for an integrated calculation, design and evaluation of the wall:

- Wall dimensioning according to DIN 1045, DIN 1045-1 or EN 1992-1 and corresponding NAs for DE, AT & CZ
- Dimensioning alternatively as resolved bored pile wall with straight or curved lagging
- Load capacity verification of piles for bending with normal force and thrust
- Bending reinforcement with a rotationally symmetrical arrangement of reinforcement
- Overlapped bored pile walls are considered for filling piles with a vaulting effect
- SLS-design for structural concrete members
- Wall dimensioning optionally for reinforcing steel or glass fiber reinforcement

The output of the special design results of the bored pile wall takes place in a continuous result output with graphics by RTRreport for the entire static system and for each construction state of the wall. The design component supplements the overall solution with the following advantages:

- Clear and efficient user interface with specific entries for bored pile walls
- Continuous verification for sheet piles with configurable output scope
- Combined design as stepped wall in combination with the full version and other wall types

**Design as slotted wall**

With this program module, slotted walls can be designed with all relevant proofs. All input parameters can be specified for this wall type in an integrated program environment. Together with the geotechnical analyses of the basic module and the design components for other wall types this module can be combined for an integrated calculation, design and evaluation of the wall:

- Wall dimensioning optionally for reinforcing steel or glass fiber reinforcement

The output of the special design results of the slotted wall takes place in a continuous result output with graphics by RTRreport for the entire static system and for each construction state of the wall. The design component supplements the overall solution with the following advantages:

- Clear and efficient user interface with specific entries for slotted walls
- Continuous verification for sheet piles with configurable output scope
- Combined design as stepped wall in combination with the full version and other wall types
### Differences between RTwalls and RTwalls EXPERT

<table>
<thead>
<tr>
<th>Function</th>
<th>RTwalls START</th>
<th>RTwalls EXPERT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of soil layers</td>
<td>5</td>
<td>unlimited</td>
</tr>
<tr>
<td>Soil layers shape</td>
<td>horizontal</td>
<td>polygonal</td>
</tr>
<tr>
<td>Water layers shape</td>
<td>horizontal</td>
<td>polygonal</td>
</tr>
<tr>
<td>Number of anchors or supports</td>
<td>5</td>
<td>unlimited</td>
</tr>
<tr>
<td>Dimensioning of stepped wall sections</td>
<td>no</td>
<td>yes</td>
</tr>
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<td>Consideration of bedding adaptation</td>
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<td>Additional presetting of hydrostatic pressures, e.g. for the description of complex water ratios</td>
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<td>Earthquake design with separate consideration of loads for selected construction states according to EN 1998 Part 1 + 5 including Appendix E for the requirements of retaining walls</td>
<td>no</td>
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