Release Notes
RTpipe - Pipe jacking

Version 18.0

Build	Module	Description	ID
16.05.18	Design	When generating the interface file for the design with NaZwei it could happen, that the file path was read-only (installation directory) and that this caused the termination of the design.	12608
07.02.18	Analyses	The favorably acting horizontal components of the standardized live loads from road, railway and airplane traffic are now also generally and independently from the embedment depth and pipe material applied. Should this approach not be wanted, then such a live load has to be generated as user-defined loading, since the horizontal loads from traffic are there zeroized by default.	12283
07.02.18	Analyses	Incorporation of the required modifications from the correction sheet (as of May 2017) to the DWA-A 161.	11775
07.02.18	Input	In the input dialog for the lateral pressure coefficients an arbitrary value between 0 and 1 is now admissible for the K2 values in the construction state as well as in the operating state.	12185
07.02.18	Analyses	For large steel pipes with a nominal diameter greater than DN 1600 (upper limit of the tabular values in DWA-A 161), the minimum wall thickness is set to 1% of the exterior diameter.	12149
07.02.18	User interface	The specification of the pipe dead load is no longer necessary. All information about the dead load of the pipes are deduced from the material unit weight and the geometry.	12043

Version 17.0

Build	Module	Description	ID
06.07.17	Output document	The internal force components for overpressure inside and outside of the pipes was not issued. Its parts were, however, considered in the sum of the stress resultants.	11574
29.03.17	Analyses	The fatigue analysis is now also carried out for covering values, which fall below the lower limit of the DWA-A-161. This is under the precondition, that the traffic load values P_static, P_dynamic und the impact coefficient are set user-defined.	10853
29.03.17	Analyses	The fatigue analysis for railroad loads (LM 71) is now also carried out for the depth of cover between 5 and 10 meters.	10610
29.03.17	Calculation	The load proportions from large-area loads (Bulk load) are internally calculated separately and then added to the vertical earth load from natural covering in the output. The support load P0 is informatively still issued in the load assumptions.	10854
29.03.17	User interface	The material safeties were not saved.	10921
29.03.17	User interface	The partial safety factor gamma.s_fat was limited to a maximum of 1.4, instead of 2.0.	10920

Release Notes
RTpipe - Pipe jacking

Version 16.0

Build	Module	Description	ID
06.07.16	Analyses	The analysis of the equivalent stress for steel pipes in the construction state has been extended with some criteria. The maximum longitudinal compressive stress in the calculation of the admissible jacking force is usually limited by the value of the real buckling stress of the buckling analysis in axial direction. Sigma.calc = Sigma.max (welded steel pipes) from the longitudinal analysis may not exceed the real buckling stress according to DWA-A 161 chapter 10. Is chapter 10 of the DWA-A 161 implemented formally for steel pipes, then the calculated Sigma.max could actually exceed the real buckling stress. The eq. (117) or (118) of the DWA-A161 are now considered correctly.	9153
06.07.16	Input	The standard steel quality for all analyses according to DWA-A161 is S235. By default, all significant material coefficients of S235 are generated automatically by the program according to the guideline. To enter differing steel qualities, the material coefficients (tensile strength, compressive strength longitudinal and transverse, yield strength) must be entered separately. In some cases, there were problems with the transfer of user-defined coefficients. The dependencies have been removed, so that each coefficient can now be modified individually.	9117
06.07.16	Output document	For train traffic loads generally 2 impact coefficients - a basic value phi0 and the reduced impact coefficient wir.phi = phi.red - are being determined. Now, both are also issued in the result list.	9167
03.02.16	General	Program modifications for the **compatibility with Windows 10**.	9519
03.02.16	Output document	The output has been enhanced with the graphical display of the system graphs for the construction and operating state.	7346

Version 15.0

Build	Module	Description	ID
04.03.15	Calculation	The horizontal soil stresses p.Th from the live load (LM3) are now determined according to figure 14b in the DWA-A161. The set of curves were analyzed for different mean pipe diameters - intermediate values for d.m are being interpolated internally by the program.	8734
04.03.15	Calculation	A *.dur file can now be called and calculated directly from the graphical user interface. With this it is still possible to edit and calculate a .*dur file outside of the user interface with an editor.	7861
04.03.15	General	The default material coefficients of the steel pipe have been adjusted to the coefficients in DWA-A161:2014 Annex A.	8757
04.03.15	General	Now, up to 10 segments can be considered for the longitudinal alignment within one DURO call. The individual segments can be straight or circular arcs, whereupon combinations of circular arcs and straights are also possible. A completely independent new description for each alignment segment is possible by the program. In the practical use, the pipe lengths and the segment type will generally vary. Not newly defined input data for a new segment will be transferred from the previous segment. For curved sections a variation of the curvature radius is allowed, i.e. the currently to be described segment is a straight with the name ibogen =0 or a i-fold circular arc with the name ibogen >=1 for existing segments. Several alternatives for the pre-loading of the thrust transfer rings of the individual segments have been implemented for pipes with thrust transfer rings. The alternatives are described precisely in the GUI, the dialog and the manual.	8730
04.03.15	Output document	The printout of the dynamically acting horizontal pressure from live loads has been missing in the result list for pipes with dynamical loading. This horizontal part has already been considered internally by the program in the calculation of the stress resultants and in the evaluation.	8732
04.03.15	Analyses	For steel or cast iron pipes an equivalent stress analysis according to section 11 in DWA-A161 has to be performed, for which now the correct partial safety factor gamma.M,ax - instead of gamma.M,rad - is being used from table 6.	8735

Build	Module	Description	ID
04.03.15	Analyses	The cube compressive strength is to be taken as basis for the admissible longitudinal compressive force of reinforced concrete pipes in the calculation of the admissible jacking force (= longittudinal analysis for one segment). In contrary, the cylinder compressive strength has to be used in the longitudinal analysis for unreinforced concrete pipes. So far, the cylinder compressive strength has been used for both types of pipes. User-defined longitudinal compressive strengths are always considered primarily, however.	8733
04.03.15	Calculation	The admissible stress double amplitude from table 22 in DWA-A161 (March 2014) are defined under a load cycle of N=2*10**6. For railway actions the amplitude values for a load cycle of N=10**8 have to be used according to A161, which is why the values from table 22 have to be multiplied with the factor 0.405. So far the too high admissible values for N=2*10**6 have been used.	8742

Version 14.0

Build	Module	Description	ID
10.07.14	Design	Generally the possible reduction of specific bending moments in the operating state according to DWA-A161 / 9.4.3.5 for steel and cast iron pipes is now considered in RTpipe, if the conditions from eq. (68) to Gl. (71) allow a reduction. The reduction concerns bending moments from vertical and horizontal earth load and the relieving bending moments due to bedding reaction pressure from earth load as well as bending moments from vertical and horizontal live load and the relieving bending moments due to bedding reaction pressure from live load. The reduction is automatically ommitted for missing internal pressure in the pipe.	8202
10.07.14	Input	Irrespective of the standard, a user-defined load cycle N can be defined specifically for reinforced concrete pipes. This load cycle N has to be agreed between the constructor and the establisher of the structural analysis. Thereby, the fatigue analysis of the structural steel in a reinforced concrete pipe usually becomes more profitable, if N_user-defined is less than N_standard. However, are the permissible characteristic fatigue range and a user-defined load cycle specified simultaneously for a reinforced concrete pipe, then the permissible fatigue range dominates the fatigue analysis. N is being ignored in this case. See the extended box "special cases" in the graphical user interface.	8201
04.06.14	Analyses	The calculation values of the manufacturing tolerance for the deviation from the perpendicularity in the pipe joint in dependency from the pipe material and the bore of the pipe are recorded in table 23 of the DWA-A161. Is a user-defined tolerance value missing in the input, then table 23 is evaluated for the longitudinal analysis internally by the program. User-defined tolerance values may be lower than the values in the table and thus make the longitudinal analysis more favorable.	8076
04.06.14	Analyses	Until now, the equivalent stress analysis of the pipe was performed for the construction state and for the operating state. Now, this analysis is also performed for the minimum design stress resultants. In many cases the design stress resultants from the minimum design (cf. DWA-A161, section 7.3) are greater than the ones from the construction state or the operating state.	8074
04.06.14	Calculation	If no admissible characteristic fatigue range is available, then a cycle N=10**8 is assumed internally by the program for reinforced concrete pipes under dynamic loading of DB loads (cover <=5.0 m). For dynamic loads from traffic (cover <=1.5 m) and for dynamic loads from a design airplane loads, a cycle N=2*10**6 is assumed internally by the program. The design value of the required fatigue range stated in the result list has to be guaranteed by the pipe manufacturer or by the person who made the structural calculations of the pipe. Furthermore, the fatigue analysis can be calculated with a variable load cycle via a user-defined admissible fatigue range without the printout of an error message. Thereby, the load cycle to be complied with has to be agreed upon in advance between the reinforced concrete pipe manufacturer, the person who makes the structural calculations and the constructor.	8075

Build	Module	Description	ID
04.06.14	Design	New control in the input, whether the minimum design can be omitted if the user wants this explicitly - cp. DWA-A161/ Section7.3 (e.g.: Pilot pipe drilling). The minimum design cannot be suppressed specifically for the reinforced concrete pipe, because the minimum reinforcements of reinforced concrete pipes result from minimum design stress resultants and also from the pipe geometry.	7719
04.06.14	General	The texts in the set type boxes have been completely revised under consideration of the DWA-A161:2004. These texts from the dialog were used analogously for the explanation of the dialog boxes in the graphical input.	7872
04.06.14	General	Up to now, the UP-GF-pipe types SN 1250 (Pipe type code 13.0), SN 2500 (Pipe type code 13.1), SN 5000 (Pipe type code 13.2) and SN 1000 (Pipe type code 13.3) were implemented. Generally, these pipe types are limited to open construction methods. Now, another UP-GF-pipe type (Pipe type code 13.4) with variable circular stiffness So was added especially for the closed construction method. This pipe type is initialized with So=30000 N/m2 by default - cp. DWA-A161 Annex A.	7721
04.06.14	Output document	Because of user requests individual headlines and other expressions have been improved in the result list; both for the analysis in annular direction of the pipe as well as for the analysis in longitudinal direction. Nothing has thus changed with regards to content.	8080
04.06.14	Output document	In order to comprehend the soil values printed in the soil protocol more easily, the soil protocol has been extended by the density D (soil group G1 or G2), the consistency I.c (soil group G3 or G4) as well as by the factors f1 (Tab. 3 or Tab.4) and f2 (Tab.5 or Tab. 15).	8078
04.06.14	User interface	The help texts for the dialog input have been extended and supplemented pursuant to the expanded program extent (Extension of the record types).	8077
04.06.14	User interface	The required amount of steel of the inner and outer ring reinforcement from minimum design, construction state and operating state can optionally be displayed on the screen for reinforced concrete pipes. Expedient option when several pipes are to be calculated one after another.	7871
04.06.14	Analyses	**Preloading VBi of the thrust transfer rings** Up to now: Iterative determination of the admissible jacking force for each segment - whether straight of bent - beginning with 30 %. No iteration is performed if a fix VBi is specified. From now on: Iterative determination of the admissible jacking force in the first segment (straight or bent) and additionally in the first bend, if this is not identical with the first segment. Is a VBi specified for the segment the iteration does not fall below this value. DURO assumes a VBi of 87 % (sigma.cal/gamma.F,al) for all other segments, which usually does not cause an iteration. However, a different value can be specified by the user.	7873
04.06.14	Calculation	The horizontal normal force N.eh in the base due to earth covering after jacking and for the standard case with a support angle 2alfa=180° is now determined correctly also in the operating state. Transposed digits from table 13 of the DWA-A161:2014 have been corrected.	8081
04.06.14	Calculation	The calculation of the bending moments due to buoyancy and due to inner and outer overpressure has been improved for the construction state as well as for the operating state.	8079
04.06.14	Calculation	The admissible equivalent stress sigma.VR (Denominator from eq. (58)) was assumed as 6.0 N/mm2. Now, adm.sigma.VR is calculated depending on the mean tensile strength (fctm) of the concrete. For higher quality concrete the value is now > 6.0 N/mm2.	7869
04.06.14	User interface	The entered values for the reinforcement grade and concrete quality of reinforced concrete pipes in the input box "Reinforcement" were set to zero, if the layout of the reinforcement in annular direction was changed again. Afterwards the fields for the concrete quality and steel grade could not be specified again, so that the reinforced concrete design in annular direction was no longer possible.	8098

Build	Module	Description	ID
21.01.14	Calculation	According to DWA-A161-2013, minimum wall thicknesses, independent from the loading situations as minimum design, construction state and operating state, have to be proven for the used pipes. Table 19 specifies the minimum wall thicknesses for concrete pipes, reinforced concrete pipes, stoneware pipes, cast iron pipes and UPG pipes. Table 20 specifies the minimum wall thicknesses of steel pipes. If the minimum wall thickness was greater than the existing wall thickness, both wall thicknesses were printed with a warning. Now, both wall thicknesses are always logged at the beginning of the result printout. The mean pipe radius, which is a decisive factor for the extend of the minimum design stress resultants, is printed in addition.	7521
21.01.14	Calculation	The analysis of the equivalent stresses for steel pipes and cast iron pipes according to section 11 of the DWA-A 161 has been implemented anew. This analysis is only performed for these types of pipes in the construction state and displayed with all required data, including the utilization level, in the result.	7520
21.01.14	Calculation	The analysis against buckling failure due to axial stresses according to section 12.2 of the DWA-A 161 has been implemented anew. This analysis is only performed for UPGF pipes in the construction state.	7519
21.01.14	Calculation	The stress and strain analyses in the construction and operating states were improved in terms of section 9.4.3. Internally, the characteristic and design stresses are calculated and printed. The stress analysis or the strain analysis is performed for the design values afterwards.	7518
21.01.14	General	The graphical input is opened when double-clicking the input file (*.ror).	7469
21.01.14	General	The installation of DURO is carried out independently and no longer together with ROHR. Thereby, an independent licensing for DURO is also implemented.	7344
21.01.14	User interface	Editing the input data via the data types can be started directly from the graphical interface. This functionality was only available via the navigator so far.	7472

Version 13.0

Build	Module	Description	ID
06.11.13	Analyses	The analysis against buckling failure due to axial stresses according to section 12.1, DWA-A 161 has been implemented anew. This analysis is carried out in the construction state for steel pipes.	7264
06.11.13	Analyses	The stability analysis at right angle to the pipe axis is performed and printed only for flexible pipes in the construction state and in the operating state. It is based on sections 9.5.1, 9.5.2 and 9.5.3 of the Arbeitsblatt ATV-DVWK-A 127:2000-08.	7262
06.11.13	Analyses	The deformation analysis in the construction state and in the operating state is performed and printed only for flexible pipes.	7261
06.11.13	Calculation	Now, the S-N curve as defined in the national annex to DIN EN 1992-1-1 is resumed for the fatigue analysis of reinforced concrete pipes. It is conform with the S-N curve in DIN 1045-1:2008. In the fatigue analysis of the reinforcement it is differentiated depending on the load model between a load cycle N = 2*10**6 and N = 10**8. The analysis can generally also be performed for other cycles, if the structural designer and the client came to an agreement about this. The analysis, which has to be performed in the operating state, is generally performed seperately for steel and concrete.	7268
06.11.13	Calculation	The minimum stress resultants are by default not being increased, regardless of the joint gaping dimension from the longitudinal analysis. Now, the increase factor depending on the oint gaping dimension from the longitudinal analysis can be activated. Furthermore, a user-defined increase factor can be specified which can exceed the increase factor due to the joint gaping dimension. In general, the highest value is always decisive for the multiplication of the minimum stress resultants.	7267
06.11.13	Calculation	Besides the jacking in loose soil and in rock, it is now possible to select a jacking in the transition area between rock and loose soil with variable mounting angles in the construction state and in the working state.	7259

Release Notes
RTpipe - Pipe jacking

Build	Module	Description	ID
06.11.13	Design	Besides the structural minimum reinforcement for reinforced concrete pipes according to DIN V 1201 / section 5.3.7(2), an additional reinforced concrete design for the minimum stress resultants according to section 7.3 of the DWA-A 161. The generated minimum stress resultants are design values.	7266
06.11.13	General	A manual with the capabilities list and the basics of the DWA-A 161 has been written.	7265
06.11.13	User interface	The input options in the user interface (and in the dialog) have been upgraded.	7263
06.11.13	User interface	The calculation of the required load class LC of the reinforced concrete pipes via an equivalent compressive load of the pipe top can now be deselected in the result printout.	7260
06.11.13	Output document	The printout for the longitudinal analysis has been restructured.	7258
14.06.13	Calculation	Significant differences between the ATV A161:1990 and the ATV DWA-A 161:2011-12 in connection with the newer reinforced concrete standards arise in the fatigue analysis for the reinforcement made of welded reinforcement cages. These differences originate from the modified S-N-curves in the reinforced concrete standards and the required load cycles depending on the loading type.	6771
14.06.13	Calculation	The analysis program **DURO** for jacking pipes has been adapted to the new **ATV 161 Stand 12/2011** and extended in key areas. The following extensions are available with program version 13.0: • Design of new pipe types made of fibre cement, concrete, cast iron and UPGF • Calculation for loose soils with bearing angles of 90° and 180°, as well as for rock with bearing angles of 30°, 60°, 90° and 120° • Soil parameters depending on compactness of ground, respectively, consistency • Adjustment of the loading cases to the A127, traffic loads also to LM1 • General new approach for common traffic loads with corresponding impact coefficients and consideration of the horizontal earth pressures • Check for minimum values of the wall thicknesses / radii ratio depending on the type of pipe • New minimum stress resultant design, respectively, determining the minimum steel requirement for reinforced concrete pipes • Reinforced concrete design according to DIN and EN, as wells as the corresponding national annexes for DE, AT, SK/CZ and UK • Consideration of DIN EN 1916 , DIN V1201 and 1202 also for concrete pipes with fatigue analysis and determination of the limit load • Analysis of the load classes for concrete pipes and reinforced concrete pipes • Analysis in longitudinal direction with consideration of the pipe connections with up to 3 thrust transfer rings for each pipe connection • Strain analysis for UPGF pipes • Stability analysis for flexible pipes according to ATV A127 • Jacking for straight or curved routes with calculation of the admissible axial forces for curved routes depending on the axial Young's modulus of the pipe material, the pipe geometry, thre thrust tranfer rings and the route geometry • Completely revised result printout for a full statical assessment	5947
14.06.13	General	Now, the **release notes** are available in **English**.	6440
14.06.13	General	Program modifications for the **compatibility with Windows 8**.	6351