RELEASE 2.5.0 May 8th, 2018

STAIMO is software for the analysis of speed/power trials both for contract delivery trials and for EEDI trials. It has been developed on behalf of STA-Group and has been made available as freeware on www.staimo.org. Conditions of Use are also posted on this site.

STAIMO 1.0 was the implementation of the ITTC 2014 Guidelines for Speed/Power Trials which have been accepted by IMO/MEPC for EEDI. It was released in January 2014 and has been downloaded and used for trial analysis worldwide by owners, yards, class and many others. Feedback from the users have resulted in minor updates; up to version 1.3.

With release 2.0, STAIMO was made fully compliant with the new ISO 15016; 2015. This new standard has been developed by ISO in close co-operation with ITTC and STA-Group over the last years. The new addition was the 'iterative method' for current correction which is offered as an option by ISO next to the existing 'means of means' method.

With releases 2.1, 2.2 and 2.2, feedback from users on details of the STAIMO software was processed, resulting in further improvements in the calculation procedures and report generation.

With release 2.3, improvements were made in the calculation of wave added resistance corrections in the STAIMO software.

With release 2.4, some improvements and bug fixes were made in the STAIMO software, in the report generation and the iterative method for current correction underwent improvements.

With the present release of STAIMO 2.5.0. further improvements were made in particular with regard to graph generation. The underlying software named Quaestor has been replaced from the 32 bits version 3.11.0 by the 64 bits version 3.14.1. .

Details about the bugfixes and improvements can be found in the appendix of this document.

STA-Group continues to develop trial procedures and analysis methods. Amongst others a new correction method for shallow water is currently validated by systematic trials on various water depths. Further co-operation with ITTC and ISO is envisaged to achieve an even better international standard resulting in new versions of STAIMO. STA-Group comprises 39 participants and is open to new members. If you have any comments or suggestions on STAIMO or if you are interested to join STA-Group, please contact us at info@staimo.org. We appreciate your feedback.

IMPORTANT NOTICE

STAIMO 2.5.0 is delivered with Quaestor 3.14.1 which is a 64 bits version. STAIMO 2.5.0 and future STAIMO versions will only work on 64 bits Windows platforms.

WARNING:

STAIMO does not work properly with Microsoft Office versions older than 2007 because it needs the PDF functionality of Microsoft Office, which is not present in versions older than 2007.

IMPORTANT NOTICE:

In MS-WORD under "Word Options" (under de main button) in "Trust Center" > "Trust Center Settings" the options

- *Enable all macro's (last option of four)*
- *Trust access to the VBA project object model*

should be selected. If this is not done, some operations on the report document cannot be performed.

In MS-EXCEL under "Excel Options" (under de main button) in "Trust Center" > "Trust Center Settings" > "Macro Settings" the option

- *Enable all macro's (last option of four)*

should be selected. If this is not done, the macro's in the Excel sheets will not run.

APPENDIX

Resolved issues and new features in STAIMO 2.5.0

1. Graph generation has been improved on various locations. The following issues were encountered and are resolved in STAIMO 2.5.0.:
    a. With curve fitting, the MCR intersection sometimes dropped outside the graph canvas;
    b. Graph ranges were not always on primary lines of the grid, making the graph not surrounded with a solid line;
    c. When the absolute rpm values became larger than the absolute power values, the speed/power curve layout got erroneous;
    d. Tidal curve vertical axis was not formatted correctly;
    e. If a large number of wind cx values were defined, only a limited part of that data was presented in the graph due to too narrow data ranges.
2. When using ship specific cx tables for wind corrections: It is no longer necessary to enter a ship specific cx table for the contract loading condition in cases where the specified contract is valid for ideal trial conditions.
3. Some minor changes were made in parameter descriptions and in the report template;
4. Some issues were resolved in the workflow with regard to changing the Contract loading condition;
5. Some bug fixes and improvements were made in Quaestor with regard to:
    a. Copying cell values in the workbase list;
    b. Table refreshing while moving through a large table;
    c. Recalculation upon changing certain switch values in the input
6. STAIMO 2.5.0 works with Quaestor version 3.14.1 which is a 64 bits version;
7. This STAIMO version expires on December 31st, 2021.

Resolved issues and new features in STAIMO 2.4.0

8. With previous versions of STAIMO, when selecting any solution node in an existing project, the solution became immediately active for adaptation. Depending on the options used in the solution and if the STAIMO version was newer than the one by which the solution was created, the solution was immediately initialised for recalculation to update the solution for any changes made in the newer STAIMO version. Starting with STAIMO 2.4.0, any existing solution which needs to adapted to a recent STAIMO version will not start automatically. This allows you to open the existing report before recalculation and to maintain solutions created by older versions for reference. Initialisation and recalculation will only occur after pressing the 'Data input' button. After selecting any existing solution in the tree view and by means of the right mouse button menu option *Sea trials analysis>Copy*, you can create a copy of this solution in your project while maintaining the original. The solution copy can be subsequently be started and recalculated.
9. Users found that the iterative method in STAIMO has frequent problems to converge. Some changes were made to the implementation to improve this: the solution of the Means of Means method is now used as starting value for the iteration. Also additional information is provided in the STAIMO interface during the iteration to show the progress of the iteration which may be of assistance to users to limit the number of iterations until the moment the error grows or keeps oscillating above the error criterion value.
10. The conversion to other loading conditions, if any, has been brought in accordance with the ISO/ITTC procedures in which the model curve for the contractual trial condition is shifted along the power axis using a delta_PS and a delta_NS. Subsequently a PS_factor and a NS_factor is determined at 75% MCR which are then used as corrections on the model curve for the contract loading condition and/or EEDI loading condition.
11. If 'Trail condition' is selected as contract condition and model tests are available, only model test for the 'Trail condition' need to be provided whereas previously the same model test had to be entered for the 'Trail condition' and the 'Contract condition'. Please note that 'Contract condition' may have to be reselected in the event of solutions created with STAIMO versions older than 2.4.0.
12. Curve fitting is now allowed in combination with model test data only when no loading condition conversion takes place, i.e. when the contractual trial loading condition equals the contract loading condition.

13. The generation of the performance graphs in the report has been improved in such way that curves on top of each other are avoided by filtering the input to SpeedPower.xls on coinciding tables. Legends in the graph headers for which no data is provided are removed from the graphs making them much less confusing and easier to interpret.
14. The report generation logic has been updated to avoid superfluous information. For example, if no loading condition conversion nor sea margin is applied, chapter 5 will not be included in the report. A number of tables in the report have been improved by changing the number of digits in certain columns to make it fit better within their borders.
15. The STAIMO input has changed on a few locations:
    a. In 'Conditions>Contract conditions' drafts and displacements are filled in and cannot be changed if 'Contract loading condition' = 'Trial condition';
    b. Idem for 'Conditions>EEDI condition', if any
    c. 'Powering test data>Contract condition' is only included if 'Contract loading condition' <> 'Trial condition';
    d. 'Use curve fitting if allowed?' has been moved from 'Ideal trials -> Contract condition' to 'Trials ->Ideal trials condition'.
16. STAIMO 2.4.0 works with Quaestor version 3.11.0 which will be the last 32 bits version of Quaestor to be issued. Future versions will be 64 bits.
17. This STAIMO version expires on July 1st, 2019.

Resolved issues and new features in STAIMO 2.3.0

18. The calculation of wave added resistance, based on RAO's from model tests and measured or computed spectra, was not always correct due to an error in the calculation of the angular difference between the RAO and the spectrum. In particular negative wave and swell directions were not dealt with correctly. The maximum angular difference between a RAO and the relative wave/swell direction is 15 degrees. The RAO's are considered symmetrical, which implies that a RAO for bow quartering waves from starboard is also valid for bow quartering waves from port. Therefore, a RAO for bow quartering waves (45 degrees) is useable for relative wave directions between 30 through 60 degrees and -30 through -60 degrees.
19. In case the wave height was zero and swell height was non-zero resulted in omission of the swell in the wave correction, resulting in zero correction for swell. This has been resolved for STAIMO 2.3.0.
20. The criterion for the relative wave and/or swell direction of 45 degrees from the bow was not applied correctly when using STAWAVE2 in STAIMO 2.2.0. This has been resolved for STAIMO 2.3.0.
21. A correction was made in the spectral density appendix of the report taking into account the availability of seakeeping RAO data in the input.
22. If no speed/power points fulfil the ISO/ITTC power limit of 65% (or any other input value) the program terminated with a failure to execute a particular relation. A clear error message will now be displayed in such event explaining that none of the speed/power points fulfil the power criterion.
23. STAIMO 2.3.0 works with Quaestor version 3.8.1.
24. This STAIMO version expires on July 1st, 2018.

Resolved issues and new features in STAIMO 2.2.0

1. By mistake, the shallow water correction according to Lackenby became dysfunctional in version 2.1.0. This has been corrected and in this version the shallow water correction is working properly;
2. In Table 9, 'True wind analysis' the check on the wind speed limit was based on the wind speed at the anemometer height where it should be based on the wind speed corrected towards the reference height instead. This has been corrected.
3. In the output of the EEDI condition the tables and text has been adapted for the event that curve fitting is used in the EEDI performance prediction. The errors in the presentations for this purpose have been resolved. In the text and in the prediction table it is now indicated that curve fitting is used and in which form.
4. STAIMO 2.2.0 works with Quaestor version 3.5.6.
5. This STAIMO version expires on July 1st, 2015.

Resolved issues and new features in STAIMO 2.1.0

1. The iterative method has been updated. The standard maximum number of iterations has been increased to 12 and this value can also be redefined in the workflow in "Actual speed trial data>Run data>Max. number of iterations". The value is limited between 5 and 100. The convergence of the iterative method varies considerably, often the convergence criterion is reached in three or four steps, sometimes it takes 15-25 steps and in some cases no convergence is reached at all, not even in 100 steps. In that case the convergence factor keeps 'penduling' around a certain value. Experience shows that when the convergence factor does not gradually reduce (which in some cases can be only slowly) during the iteration it is not useful to further increase the number of iterations;
2. The 'intermediate derived data' table has been updated; the RAA is included;
3. The boundary conditions of wind were reported incorrectly. This has been fixed;
4. With opening the STAIMO software, IMO documentation is included, describing the speed trial procedures from ITTC and ISO 15016;
5. There is no longer an option to choose for '3 nautical miles' for the run duration. Only durations of 10 or more minutes can be entered;
6. The explanation of the maximum displacement offset has been replaced to the "Actual speed trial data" entity;
7. An incorrect IMO number now turns red in the STAIMO interface;
8. The entered G-modulus of a propeller shaft is now pre-entered as 82400 N/mm2 by default as specified by ISO15016;2015. This value can still be modified by input of the certified specific shaft G-modulus;
9. The explanation of the overload factors now includes the sentence: "These factors should be available from model tests.";
10. The lower power limitation for the runs that are taken into account, now has to be entered as a percentage in "Actual speed trial data>Run data>ITTC/ISO power criterion". According to ITTC/ISO, only power settings above 65% MCR are taken into account for the determination of the offset between model tests and actual speed trials. The percentage used is included in the report;
11. The message for the application of a shallow water correction has been updated for cases of too shallow water. The shallow water correction is maximized to the minimum water depth as described by the ITTC/ISO;
12. Notifications on the requirements on draught and trim have been added;
13. When STAWAVE2 is used for the correction of wave induced added resistance, the value of Kyy/Lpp is reported;
14. For STAWAVE2 the new limits of application as specified in ISO 15016:2015 are applied.
15. When the method of Fujiwara is used for the correction of wind, a correction to a reference height is included. This reference is not 10 m above the water level as for wind tunnel tests, but calculated by: Zref = (7/8)^7*Z. Z is equal to the height of the anemometer above the water during trials. The true wind speed is corrected to the reference height according to ITTC/ISO procedures;
16. The font size of the legends in the speed/power, speed/rpm and rpm/power graphs has been increased to 8 points;
17. In case no model tests are available, too many speed/power relations were presented in the graphs. This has been fixed;
18. In case no model tests are available, the 'service curve' was at another level than the 'ideal trials curve', even if the sea margin was 0%. This bug has been fixed;
19. The iterative method is now based on the starting time + run duration/2 instead of the run starting time as it was previously;
20. Some typing errors, a.o. in the explanation of the curve fitting procedure have been corrected;
21. The logic related curve fitting of the prediction curve has been checked and tested for multiple use cases. Curve fitting is now allowed and used if the requirements as described in the ITTC/ISO rules are fulfilled;
22. Some adaptations have been made to the knowledge base in order to avoid problems when changing certain values in a solution. An example is e.g. changing the displacement in the Contract or Contract trial condition which should result in rechecking the data in the actual trial condition. Another example is changing from using wind coefficients into Fujiwara;
23. In view of the table layout limits, the decimals in the values for wave and wind corrections were removed;

24. Some adaptations were made to the framework in order to improve the behaviour when changing values in a solution, in particular for the immediate recolouring of affected nodes when moving to a next node;
25. In some cases, the table with derived intermediate data was not properly formatted which has been fixed;
26. The x-axis of measured spectra in the report was not correct; it must be "Frequency [rad/s]" instead of "Wave period [s]";
27. The dimension of "Overload factor on etaD" should not be [%] but [-] as it is a coefficient.
28. The x axis of the current curve now shows the correct starting time rounded in hours instead of 0:00 which was incorrect;
29. STAIMO 2.1.0 works with Quaestor version 3.5.2. Some issues were resolved in Quaestor 3.5.2 which are related to the creation of additional solutions in a (STAIMO) project and the problems with expired licenses for other Quaestor applications than STAIMO installed on the user's computer.

Resolved issues and new features in STAIMO 2.0.0

1. STAIMO 2.0 is now also fully compliant with the new ISO 15016; 2015 at the same time STAIMO 2.0 still fulfils all requirements by the ITTC Guidelines for Speed Power Trials 2014 which are accepted by IMO/MEPC for EEDI;
2. The main addition compared with the previous version 1.3 is the implementation of the 'iterative method' for the current correction. At the same time the original 'means of means' method as specified by ITTC and also accepted by ISO is still available.
3. During testing of the iterative method it was found that with very large corrections for e.g. wind or waves, the iterative method may not converge into a realistic solution. It is advised to always check the current curve in section 4.4 of the report. If the current speeds are very high, you may conclude that the solution is not valid. If possible it is advised to also perform a Means of Means analysis and to compare the resulting current curves.
4. The correction for wind added resistance was based on the averaged speed value of the run set and not on the basis speed over the ground as it should be. This has been changed into a correction on the basis of speed over the ground;
5. STAIMO 2.0.0 is delivered with Quaestor 3.4.18. Some issues were resolved in the graphical user interface which allowed the user to close the Explanation and the Plots and Drawings panel without the ability of re-open them in an convenient way. Also the Load Defaults button th the Options>files panel caused the user interface to get in a undesired state;
6. Some default values were changed in accordance with international standards, for example the standard value for sea water density was changed from 1025 into 1025.8;
7. Some issues in the reporting were resolved and small adaptations were made. The wind speed and wave height are now checked against the limits provided by IMO/ITTC/ISO 15016 and their compliance is presented in the report's tables. Wave and swell heights are checked against the above mentioned limits and compliance/non compliance is also presented in the input table. When limits are exceeded, please note possible effects described in item 3);
8. Without powering model tests the tidal curve was not presented in the report which has been resolved;
9. The legends in the graphs were adapted to make them more easy to read;
10. The option has been introduced to use curve fitting instead of shifting the model curve for the contract condition and for the EEDI condition when the contract/EEDI draught and displacement are equal to the trial draught and displacement. This option can be used if there are 4 or more non-discarded power settings. If no powering model tests are available, this method is always used if there are 4 or more non-discarded power settings;
11. A sign error was found and resolved in the contract wave correction when using RAO data from model tests;
12. The option has been introduced to input the MCR percentage under which power settings are discarded in the performance prediction. The minimum accepted is 65% MCR, any power setting below the provided percentage is discarded. In the report the provided percentage is presented and whether or not it diverts from the minimum accepted factor of 65%.

Resolved issues and new features in STAIMO 1.3.0

1. The correction for wave added resistance on the basis of RAO data was used from OMEGA=0 to the maximum value of OMEGA in the RAO. Since RAO data are often not defined from OMEGA=0 onward, extrapolation was performed in the multiplication from the RAO with the wave spectrum which could result in a negative contribution of the wave added resistance from OMEGA=0 to OMEGA=minimum value in the RAO table. In extreme cases this could lead to small negative or even positive wave added resistance corrections. This problem was solved by using the real minimum OMEGA of the RAO table instead;
2. In version 1.2.0, the displacement in table 10 (ideal trial conditions) gave a displacement equal to the actual trial displacement which is not correct. This result is already correct towards the "agreed trial displacement". Table 13 compares the same values directly with the model test, so the displacement should be the same (agreed trial displacement) as has been done in this version 1.3.0;
3. In version 1.2.0, a negative wave direction was not allowed for the actual trial data, which has been corrected;
4. In case of a negative light running margin the notification "propeller is heavy running" is added to the report conclusions;
5. The Fujiwara wind correction method was not properly working in versions 1.1.0 and 1.2.0 due to some uncertainty in sign conventions. These uncertainties have been resolved and the method now gives good results in version 1.3.0;
6. An intersection was added to the speed/power graph and to the conclusions: "To achieve the contract speed, a total shaft power of XX kW is required";
7. A prediction table was added to the report containing the prediction in ideal contract trials condition (i.e. the condition at which the trials should be conducted at);
8. Power and RPM curves were added to the prediction diagrams for the ideal contract trial condition;
9. The averaged corrected trial points should now be within the speed range of the corresponding model tests. If an averaged corrected point is outside of the speed range, the point is not taken into account in the calculation of the offset to the model tests to arrive at the contract condition;
10. The corrected points that are omitted are coloured red with grey instead of only red for the points that are not omitted so that the diagram shows the distinction between used and omitted points;
11. The minimum power setting of the speed runs during the trials has been changed from 65 per cent contract power in STAIMO version 1.2.0 into 55 per cent MCR. This is less restrictive than the 65 per cent MCR which is stated in ITTC part I page 12;
12. Instead of solution folders with names containing a time stamp, in Quaestor 3.4.13 the solution folders are given the same name as the solution. This implies that neither of the characters \ / : * ? \ " < > | can be used in solution names and that solution names must be unique in the project. Renaming of folders in existing project using the old naming conventions to the solution names is performed automatically if the forbidden characters are not used in the solution name. Renaming a solution results in renaming the solution folder upon saving the project.
13. A number of typing errors in descriptions have been corrected and table layout improvements have been made;
14. STAIMO 1.3 works properly with legal versions of MS-Office 2007, 2010 and 2013.