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Title:

UltraREEL – User's Manual

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Table of Contents

1 Introduction

This document gives a quick user guide for Ultra Deeps reel capacity calculation.

2 References

[1] UD Doc. No.: 00000-INT-UM-KNT-20071129-1, Rev 14 “UmbiliCAD® - User’s Manual”, dated: April 8th, 2015

3 User Guide

3.1 General

UltraREEL is a reel capacity calculation plug-in to the Ultra Deep umbilical drawing tool UmbiliCAD, ref. (1). UltraREEL is started from UmbiliCAD by selecting 'Modules -> UltraREEL'. The Plug-in can also come as a stand-alone application if you do not have UmbiliCAD installed. If you do, however, and an element/cross section is selected first, mass and outer diameter of the element is loaded into the tool. For an umbilical you should select the outer sheath, and everything within that sheath will be included in the mass calculation.
Although this manual will use the term "umbilical", the software works for any product of the similar type that shall be put on a reel, e.g. cables or wires.

The UltraREEL main window is shown in Figure 1.

To ensure compliance between the umbilical, the windup setup and the reel, some data on these three points has to be entered in the corresponding tables on the left side of the window.
If all information is available, the right side of the window shows the resulting windup setup and compares the available capacity on the reel to the setup demands.
In the Setup Details table the details of each windup layer are presented.

UltraREEL also comes with a reel database that can be set up with existing reels in order to quickly load and check them for compliance with the designed umbilical. The data of the reel marked as default will be loaded on program start. All reels in the reel database that fulfill the umbilical and setup requirements can be chosen from the dropdown menu in the reel input section. The "Reel Database" button can be used in order to access the reel database. More on the reel database can be read in section 4.

3.2 Required Input

UltraREEL uses three input sections to split up the input data required for the reel capacity calculation. After each input change, a capacity check is performed.

3.2.1 Umbilical Data

The information about the umbilical required are

- **Outer diameter [mm]** (the value can automatically be acquired from UmbiliCAD)
- **Mass per meter [kg/m]** (the value can automatically be acquired from UmbiliCAD)
- **Length [m]**
- **Terminations storage width [mm],** the part of the reel width reserved to terminations (termination head, bend stiffener).
- **Terminations weight [t]**, the weight of the terminations transported/stored on the reel.

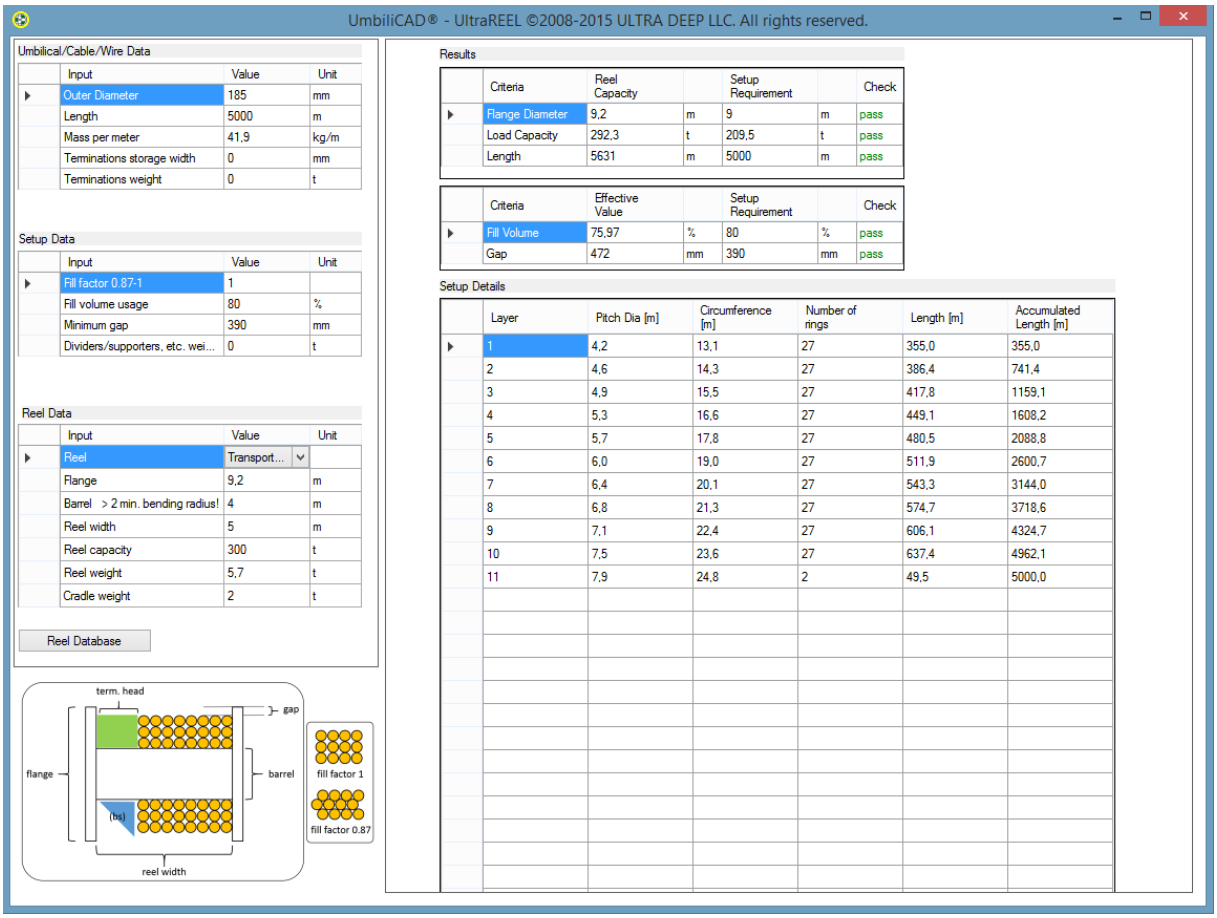


Figure 1: UltraREEL main window.

3.2.2 Setup Data

Setup input is all the additional data affecting the reel capacity that is associated with the windup. UltraREEL offers three parameters to robustly estimate the reel capacity with regard to windup imperfections:

- **Fill factor** (0.87-1.0), see Figure 2.
- **Fill volume usage [%]**, percentage of the reel volume that can be used for the umbilical. This value is another method of assigning a minimum gap.
- **Minimum gap [mm]**, minimal distance from the reel flange diameter to the outermost layer of the umbilical on the reel. This value is another method of assigning the fill volume usage.

Additionally, in this section extra mass loads on the reel induced by dividers, supporters, or anything else not covered by the umbilical and/or reel input can be taken into account in

- Dividers/Supporters/etc. weights [t].

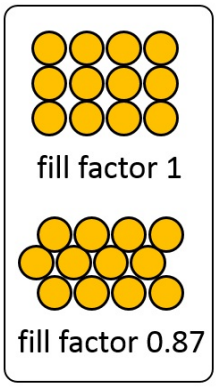


Figure 2: Fill factor definition.

3.2.3 Reel Data

The definition of the dimensions of the reel are shown in Figure 1. Apart from the reel dimensions, information about the reel capacity and weights are required.

- **Reel:** The dropdown list allows the selection of the reels from the database that fulfill the umbilical/setup requirements. On selection, the reel data is loaded to the form from the reel database.
- **Flange [m]**, diameter of the reel flange.
- **Barrel [m]**, diameter of the reel barrel. Make sure this is > 2*(minimal bending radius) of the umbilical.
- **Reel width [m],** inner width of the reel.
- **Reel capacity [t]**, the mass capacity of the reel.
- **Reel weight [t],** the mass of the reel.
- **Cradle weight [t]**, the mass of the reel cradle.

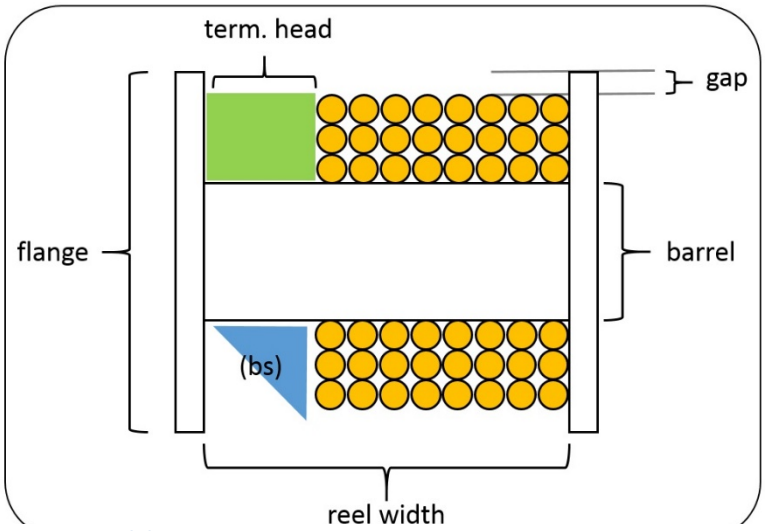


Figure 3: Reel dimensions.

3.3 Results

The results of the capacity check is seen on the tables on the right side of the UltraREEL window, and in Figure 4. If you have selected a reel by picking one from the dropdown menu in the reel section, all of the checks will be “pass”.

Results

	Criteria	Reel Capacity		Setup Requirement		Check
▶	Flange Diameter	9,2	m	9	m	pass
	Load Capacity	292,3	t	209,5	t	pass
	Length	5631	m	5000	m	pass

	Criteria	Effective Value		Setup Requirement		Check
▶	Fill Volume	75,97	%	80	%	pass
	Gap	472	mm	390	mm	pass

Figure 4: Capacity check result tables.

The column “Reel Capacity” shows the values the reel admits, while the values in the “Requirement” column are the ones required by the setup/umbilical. The “Check” column compares the requirements to the available values and returns either “pass” if the values are within the required ranges, or “fail” if the requirements are not met.

The “Flange Diameter”, “Load Capacity” and “Length” criteria are hard criteria. If one of them is not met, the umbilical will not fit to the reel.
The “Fill Volume” and “Gap” criteria are soft criteria, and the windup may in some cases work, especially if the effective values are only slightly exceeding the given setup values.

4 Reel Database

The reel database allows the storage of reel data to avoid the filling of reoccurring data into UltraREEL. The database can be opened from UltraREEL by activation the “Reel Database” button on either panel. Figure 5 shows the reel database dialog. The dialog consists of the following elements:

- **Reel list:** A list of all the reels in the database, and their properties.
- **Reel property window:** A window showing the reel properties, including a more detailed explanation. The property values can be edited in this window.
  Reel properties are: (see Figure 2 for dimension definitions)
  Name: Each reel needs a unique name, it is wise to choose a description that allows for a quick identification of the reel.
  Flange: Flange diameter in [m].
  Barrel: Barrel diameter in [m].
  Width: Width between inner flange walls [m].
  Reel Capacity: Mass/load capacity of the reel [t].
  Reel Weight: Weight of the reel [t].
  Cradle Weight: Weight of the reel cradle [t].
  Default Reel: Flag that describes if the reel shall be set as the default reel. There is exactly one reel flagged as default in the database. The default reel will be loaded at the program startup, therefore the most commonly used reel should be the choice for the default reel.
- **Add button:** New reels can be added to the database by activating this button.
- **Remove button:** By activating this button, the selected reel will be removed from the database.
- **Select Reel button:** The selected reel will be used for the UltraREEL calculation. All changes in the reel database are stored and the reel database dialog closes.
- **Cancel button:** All changes in the reel database are stored and the reel database dialog closes.

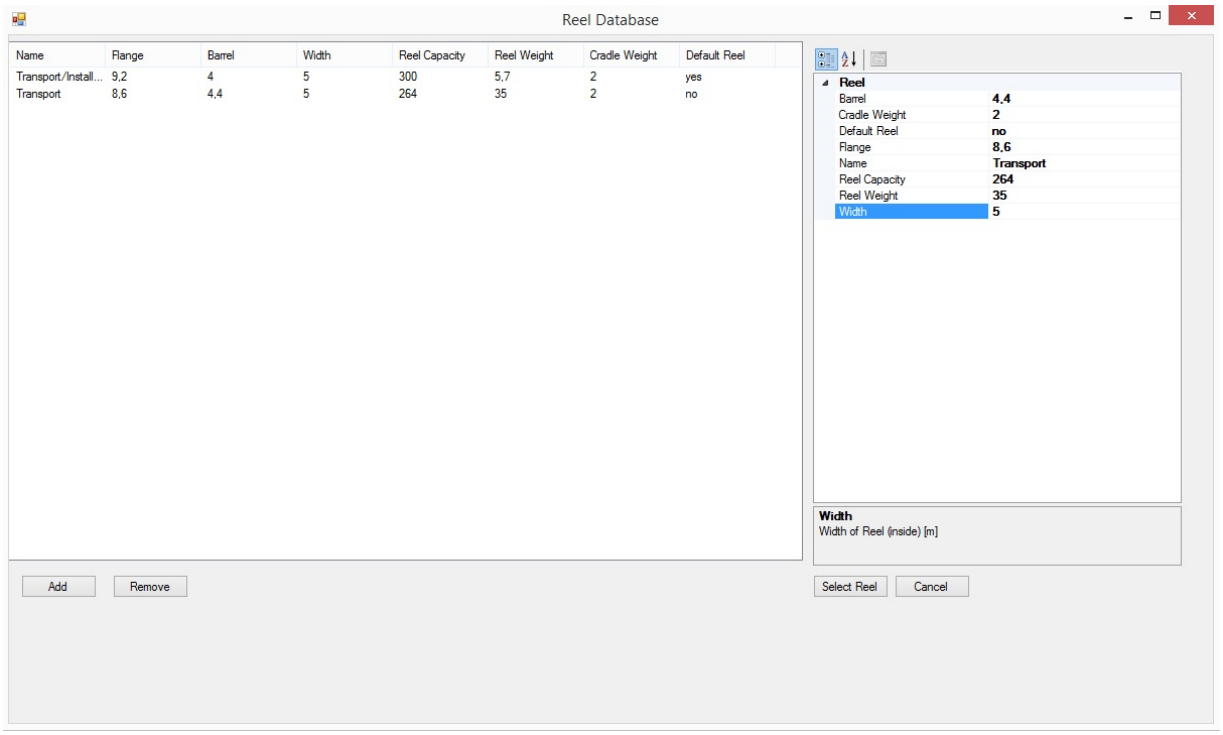


Figure 5: UltraREEL reel database view.

5 Printing

By selecting File->Print in UmbiliCAD the report from reel calculations can be printed. Alternatively, or if the stand alone version of UltraREEL is used, the print menu can be accessed by right clicking into the user interface and selecting either “Print” or “Print Preview” from the appearing context menu.

Print output example:

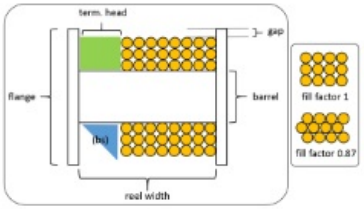
Input	Value	Unit
Outer Diameter	185	mm
Length	5000	m
Mass per meter	41,9	kg/m
Terminations storage width	0	mm
Terminations weight	0	t

Input	Value	Unit
Fill factor 0.87-1	1	
Fill volume usage	80	%
Minimum gap	390	mm
Dividers/supporters, etc. we	0	t

Input	Value	Unit
Reel	Transport/Installation	
Flange	9,2	m
Barrel > 2 min. bending ra	4	m
Reel width	5	m
Reel capacity	300	t
Reel weight	5,7	t
Cradle weight	2	t

Criteria	Reel Capacity		Setup Requirement		Check
Flange Diameter	9,2	m	9	m	pass
Load Capacity	292,3	t	209,5	t	pass
Length	5631	m	5000	m	pass

Criteria	Effective Value		Setup Requirement		Check
Fill Volume	75,97	%	80	%	pass
Gap	472	mm	390	mm	pass



Layer	Pitch Dia [m]	Circumference [m]	Number of rings	Length [m]	Accumulated Length [m]
1	4,2	13,1	27	355,0	355,0
2	4,6	14,3	27	386,4	741,4
3	4,9	15,5	27	417,8	1159,1
4	5,3	16,6	27	449,1	1608,2
5	5,7	17,8	27	480,5	2088,8
6	6,0	19,0	27	511,9	2600,7
7	6,4	20,1	27	543,3	3144,0
8	6,8	21,3	27	574,7	3718,6
9	7,1	22,4	27	606,1	4324,7
10	7,5	23,6	27	637,4	4962,1
11	7,9	24,8	2	49,5	5000,0