MakaiSpan

Span Analysis Plug-in for Makai Software and Third Party Applications

	Кр	Cum. Cable	Slope	Moment	Shear	
	[m]	[m]	[Deg.]	[Nm]	[N]	
06.096	61.967	163.319	-7.251	-0.852	41.604	
06.097	61.978	163.330	-7.395	-0.958	41.549	
06.099	61.989	163.341	-7.557	-1.077	41.493	
06,100	62.000	163,352	-7.738	-1.209	41,438	
06.100	62.000	163.352	-7.738	-1.209	66.614	
06.163	62.400	163.757	-9.222	0.027	64.614	
06.226	62.800	164.162	-8.968	0.050	62.614	
06.288	63.200	164.567	-8.682	0.050	60.614	
06.347	63.600	164.971	-8.396	0.050	58.614	
06.405	64.000	165.375	-8.109	0.050	56.614	
06.461	64.400	165.779	-7.823	0.050	54.614	
06.514	64.800	166.183	-7.536	0.050	52.614	

- Route-1	n	[m]	[m]	[m]	[m]	[Deg.]	[Nm]	[N]	[0-2	ſ	1	[m]	[m]	[m]	[m]	[deg]
Solution-1 Solution-2 Route-2	1726	161.967	-106.096	61.967	163.319	-7.251	-0.852	41.604	_	Ē	135	134.000	0.000	-105.800	134.000	-16.699
	1727	161.978	-106.097	61.978	163.330	-7.395	-0.958	41.549		F	136	135.000	0.000	-106.100	135.000	-21.801
	1728	161.989	-106.099	61.989	163.341	-7.557	-1.077	41.493		Г	137	136.000	0.000	-106.500	136.000	-16.699
	1729	162.000	-10E.100	62.000	163,352	-7.739	-1.209	41,430			138	137.000	0.000	-106.800	137.000	-21.801
Solution-2	1730	162.000	-106.100	62.000	163.352	-7.738	-1.209	66.614		Г	139	138.000	0.000	-107.200	138.000	-30.964
	1731	162.400	-106.163	62.400	163.757	-9.222	0.027	64.614			140	139.000	0.000	-107.800	139.000	-30.964
	1732	162.800	-106.226	62.800	164.162	-8.968	0.050	62.614			141	140.000	0.000	-108.400	140.000	-30.964
	1733	163.200	-106.288	63.200	164.567	-8.682	0.050	60.614			142	141.000	0.000	-109.000	141.000	-16.699
	1734	163.600	-106.347	63.600	164.971	-8.396	0.050	58.614			143	142.000	0.000	-109.300	142.000	-5.711
	1735	164.000	-106.405	64.000	165.375	-8.109	0.050	56.614	4		144	143.000	0.000	-109.400	143.000	11.310
	1736	164.400	-106.461	64.400	165.779	-7.823	0.050	54.614			145	144.000	0.000	-109.200	144.000	11.310
	1737	164.800	-106.514	64.800	166.183	-7.536	0.050	52.614			146	145.000	0.000	-109.000	145.000	11.310
	1738	165.200	-106.566	65.200	166.586	-7.250	0.050	50.614			147	146.000	0.000	-108.800	146.000	-5.711
	1739	165.600	-106.615	65.600	166.989	-6.963	0.050	48.614			148	147.000	0.000	-108.900	147.000	-5.711
	1740	166.000	-106.663	66.000	167.392	-6.677	0.050	46.614	1		149	148.000	0.000	-109.000	148.000	-5.711
	1741	166.400	-106.709	66.400	167.795	-6.391	0.050	44.614			150	149.000	0.000	-109.100	149.000	-5.711
	1742	166.800	-106.752	66.800	168.197	-6.104	0.050	42.614			151	150.000	0.000	-109.200	150.000	11.310
	1743	167.200	-106.794	67.200	168.599	-5.818	0.050	40.614			152	151.000	0.000	-109.000	151.000	11.310
	1744	167.600	·106.833	67.600	169.001	-5.531	0.050	38.614			153	152.000	0.000	-108.800	152.000	16.699
	1745	168.000	-106.871	68.000	169.403	-5.245	0.050	36.614			154	153.000	0.000	-108.500	153.000	21.801
	1746	168.400	-106.907	68.400	169.804	-4.958	0.050	34.614			155	154.000	0.000	-108.100	154.000	21.801
	1747	168.800	-106.940	68.800	170.206	-4.672	0.050	32.614			156	155.000	0.000	-107.700	155.000	30.964
	1748	169.200	-106.972	69.200	170.607	-4.385	0.050	30.614			157	156.000	0.000	-107.100	156.000	11.310
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MakaiSpan is a new software engineering tool designed to assist ocean cable and pipeline engineers in calculating an accurate representation of the pipe/cable shape on the seafloor, including: • the location and length of free spans,

- the reaction forces and bend radii at the seafloor contact points, and
- the induced shear forces and moments along the suspended pipe/cable.

Running on a Microsoft Windows platform, the main computational engine uses bathymetry profiles together with the physical properties of the pipe/cable and the applied horizontal tension, in order to obtain a solution of the pipeline/cable shape along the seafloor. Results are displayed graphically in a 2D view and can be viewed in tabular form as well. Seabed profile data is read from 2D (X,Z) or 3D (X,Y,Z) ASCII data files containing the spatial coordinates and water depth along a specific route. Each profile (track) is automatically assigned an editable route name in the project explorer window. The seabed profile is viewed and it can be edited in the Route Editor window (shown in the figure above). **A 2D Profile Viewer** window showing depth vs. distance along the selected Route is shown at the bottom of the screen (selected route is shown as a black line in figure below).

Multiple solutions can be shown simultaneously and each solution can be presented with different line types and colors. Sections of cable/pipe where the length of the spans exceeds the critical span length, defined by the user, are highlighted in red in the Solution Viewer window, (see figure on first page) and by vertical red lines in the profile viewer window (see figure below). The same applies if the bend radius is smaller than the critical value of bend radius defined by the user.



In the figure above, the 2D Profile Viewer shows the route, in black, and two different solutions obtained along the primary route. Both solutions analyze the same cable with the only difference being that the solution in red has a horizontal tension equal to half of that used to obtain the solution in blue. The Kp marker (shown above as a vertical blue line with associated distance) can be used to scroll along the solutions and obtain specific information regarding any point along the suspended pipe/cable. These data are shown in the information bar at the bottom of the window. The Kp marker is also linked to the Route Editor window and to the Solution Viewer window. As the Kp is moved along the profile window (by clicking and dragging the mouse), the Solution and Route Editor windows automatically scroll to the specific Kp row allowing the user to focus on problem areas.

The MakaiSpan module works with:

- MakaiPlan & MakaiPlan Pro;
- MakaiDTM & 3D GridViewer;
- and can easily integrate with third-party software applications (contact Makai).

For more information and pricing, contact Makai Ocean Engineering.



