



## 有關Tendon Arrangement表中計算垂直分量的問題？

以Tendon Arrangement分別匯出TOP(Tendon Group)與BOT(Tendon Group)資訊 及 將兩個設為一個Tendon Group匯出，其垂直分量(Tendon Number\*Average Sin Theta\*Average Force)為何會不同？如下圖所示：

Tendon Group	Elem	Part	Tendon Number	Yp (m)	Zp (m)	Average Sin Theta ((deg))	Average Cos Theta ((deg))	Average Stress (tonf/m <sup>2</sup> )	Average Force (tonf)	垂直分量(tonf)
TOP	19	I	40	0	1.201	0.0386	0.9993	111003.1099	292.5265	451.6609
BOT	19	I	3	0	-0.6458	0.0295	0.9996	119797.8505	315.7033	27.9397
									sum	479.6007
TOP&BOT	19	I	43	0	1.0721	0.0585	0.9983	111616.6965	294.1435	739.9180

兩者不相等!!



計算的結果不相等的原因是，必須先推算兩個別 Tendon Group (TOP+BOT) 鋼腱群組的合併群心座標 Zp，隨後計算得 Zp (J-I) 與 Average Sin Theta，最終所得的垂直分量結果差異不大，請看下圖。

Elem	Length (m)	Part	Tendon Number	Yp(m)	Zp(m)	Zp(J-I)	SQRT(L)	Average Sin θ	Average Cos θ	Average Stress (tonf/m <sup>2</sup> )	Average Force (tonf/m <sup>2</sup> )	Vertical Force
TOP&BOT	19	I	43	0	1.0721	0.1173	2.003437	0.0585	0.9983	11632.7942	294.4859	742.6787155
	19	J	42	0	1.1894			0.0585	0.9983	112953.043	297.6652	
TOP	19	I	40	0	1.201			0.0386	0.9993	111020.5062	292.5723	
	19	J	40	0	1.2782			0.0386	0.9993	112584.9625	296.6952	
BOT	19	I	3	0	-0.6458			0.0295	0.9996	119796.6349	315.7001	
	19	J	2	0	-0.5867			0.0295	0.9996	120314.6514	317.0652	
(TOP+BOT) : Zp (Part I)					1.072153			0.058621			293.6736238	740.2624043
(TOP+BOT) : Zp (Part J)					1.189395	0.117242	2.003433	0.058621				

結果  
差異不大

有關Average Sin θ 及 Average Cos θ 的計算可以參考 Online Help 說明：

[http://manual.midasuser.com/EN\\_Common/Civil/940/Start/07\\_Results/12\\_Result\\_Tables/09\\_Tendon/Tendon\\_Arrangement.htm](http://manual.midasuser.com/EN_Common/Civil/940/Start/07_Results/12_Result_Tables/09_Tendon/Tendon_Arrangement.htm)

或請參考下圖說明。

Elem	Part	Tendon Number	Yp (m)	Zp (m)	Average Sin Theta	Average Cos Theta	Average Stress (kN/m <sup>2</sup> )	Average Force (kN)
30	I	1	2.5500	2.7334	-0.0781	-0.9969	1119811.7995	2951.0400
30	J	1	2.5500	2.3612	-0.0781	-0.9969	1113997.3339	2935.7172