HELIX™

Dear Anthony,

Helix behaves differently than traditional steel fibers. Recognizing the unique helix stress-strain relationship we developed a design methodology (based on Japanese Society of Engineer's design methods and ACI design methods) nearly ten years ago. Since this time we've used this procedure to design literally thousands of concrete structures with complete success (we have never had a structural failure in the field). Over the years some of our customers have tested this claim by conducting their own tests. In every case the Helix design method has proven able to predict performance with remarkable precision given the non-homogeneity of concrete. The table below summarizes the cases and a summary comparison sheet for each is attached for your review.

Application and Date	Result
Deep Foundations, 2011	test within 5% of prediction
Suspended Deck Panels, 2008	test within 2% of prediction
Wall Panels, 2007	test within 2% of prediction
Bridges, 2004	test within 2% of prediction

The same methods can be used to design tunnel lining segments without the need for full scale testing.

Sincerely,

Luke R Pinkerton

Luke Pinkerton
President & CTO Polytorx

Helix Steel
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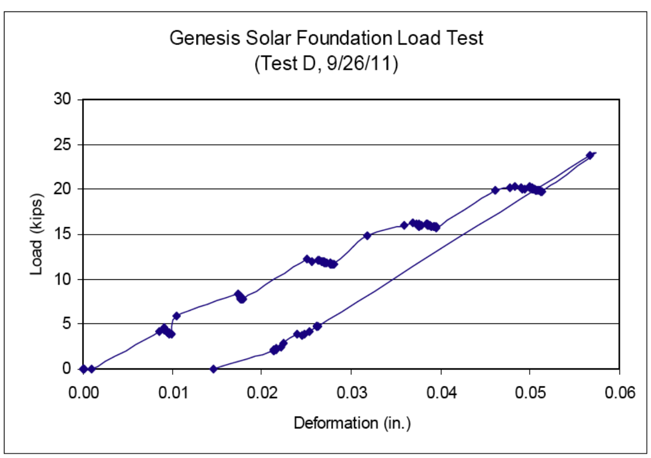
Side By Side Performance – US Units

Date: Nov 3, 2011

Project Name: September 2011 Test

Input		Test Result	Predicted
Case Description		39 " Diameter Caisson Field Test Result – Ultimate Strength	Helix with 25 lb/yd
Iterative Design Factors			
Section Thickness, h	in	34.6	34.6
Helix Dosage, Dos	lb/yd^3		**25**
Helix Resistance Factor			0.54
Concrete Strength,f'c	psi		4000
Rebar/Mesh Input			
Type			
Cross Section Area, a_b	in^2		
Spacing, s (non zero)	in		
Depth, d	in		
Number of Layers			
Yield Strength, fy	psi		
Resistance Factor			
Section Width, b	in	34.6	34.6

Output			
Bending Moment Capacity	**kip-in**	**2856.0**	**2993**
Percent Increase			5%



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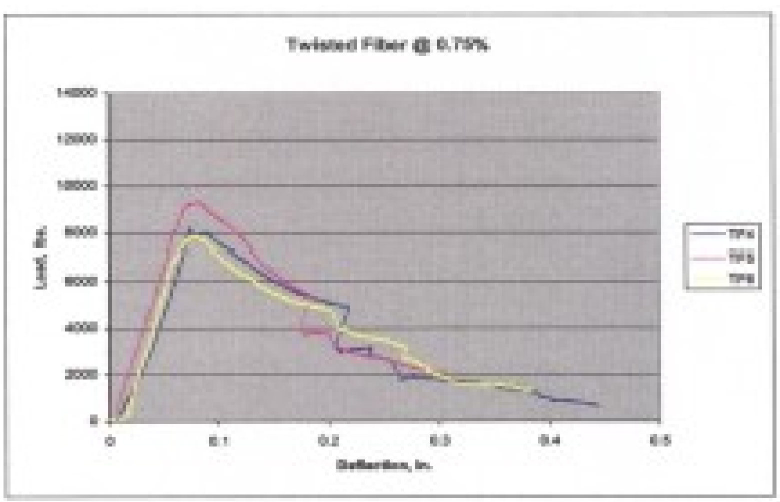
Side By Side Performance – US Units

Date: Nov 3, 2011

Project Name: May 2004 ConSpan Test

Input		Test Result	Predicted
Case Description		May 2004 Test Report Peak Post Crack Strength	Helix with 100 lb/yd
Iterative Design Factors			
Section Thickness, h	in	6	6
Helix Dosage, Dos	lb/yd^3		**100**
Helix Resistance Factor			0.9
Concrete Strength,f'c	psi		4000
Rebar/Mesh Input			
Type			
Cross Section Area, a_b	in^2		
Spacing, s (non zero)	in		
Depth, d	in		
Number of Layers			
Yield Strength, fy	psi		
Resistance Factor			
Section Width, b	in	6	6

Output			
Bending Moment Capacity	**kip-in**	**80.0**	**81.5**
Percent Increase			2%



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Side By Side Performance – US Units

Date: Nov 3, 2011

Project Name: January 2007 Fibre Bond Test

Input		Test Result	Predicted	Predicted
Case Description		January 2007 Test Report Peak Post Crack Strength 30 lb/yd Helix	Rebar Design 6x6 D8 x D8 WWF	4” with 30 lb/yd Helix
Iterative Design Factors				
Section Thickness, h	in	4	4	4
Helix Dosage, Dos	lb/yd^3			**30**
Helix Resistance Factor				0.85
Concrete Strength,f'c	psi	5000	5000	5000
Rebar/Mesh Input				
Type				
Cross Section Area, a_b	in^2		0.080	
Spacing, s (non zero)	in		6	
Depth, d	in		2.5	
Number of Layers			1	
Yield Strength, fy	psi		70000	
Resistance Factor			1	
Section Width, b	in	12	12	12

Output				
Bending Moment Capacity	**kip-in**	**28.1**	**26.8**	**27.5**
Percent Increase			-5%	-2%

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HELIX™

Side By Side Performance – US Units

Date: Nov 3, 2011

Project Name: June 2008 DTE Energy Tests

Input		Test Result	Predicted	Design 2
Case Description		June 2008 Test Report Peak Post Crack Strength 90 lb/yd Helix	1.25" with 90 lb/yd Helix	
Iterative Design Factors				
Section Thickness, h	in	1.25	1.25	
Helix Dosage, Dos	lb/yd^3		**90**	
Helix Resistance Factor			1	
Concrete Strength,f'c	psi	5000	5000	
Rebar/Mesh Input				
Type				
Cross Section Area, a_b	in^2			0.2
Spacing, s (non zero)	in			12
Depth, d	in			2
Number of Layers				1
Yield Strength, fy	psi			60000
Resistance Factor				0.9
Section Width, b	in	12	12	12

Output				
Bending Moment Capacity	**kip-in**	**7.6**	**7.4**	**#DIV/0!**
Percent Increase			-2%	#DIV/0!

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End view Figure 2

Max = PL/4

7.6 kip-in

Load test Results

Sample	Max. Load Pound	Defection inches	Load after failure
Old panel	2,723	0.80	2,100/700
New Panel 1	3,297	0.55	2,200
New Panel 2	3,557	0.49	2,000
New Panel 3	3,054	0.48	1,500
Average (new pnl)	3,302	0.51	1,900