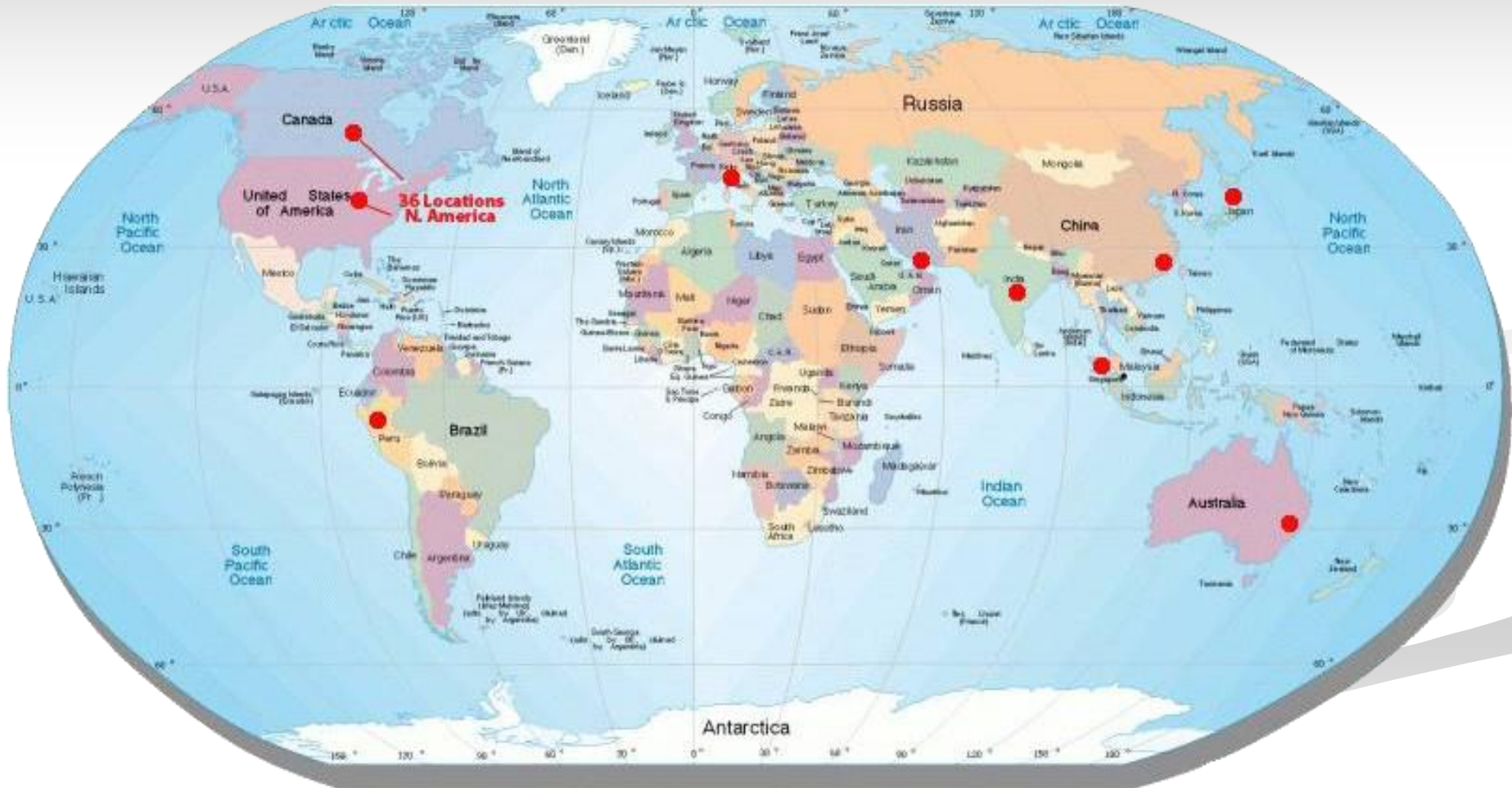


Twin-Path® Synthetic Roundslings Boom Pendants



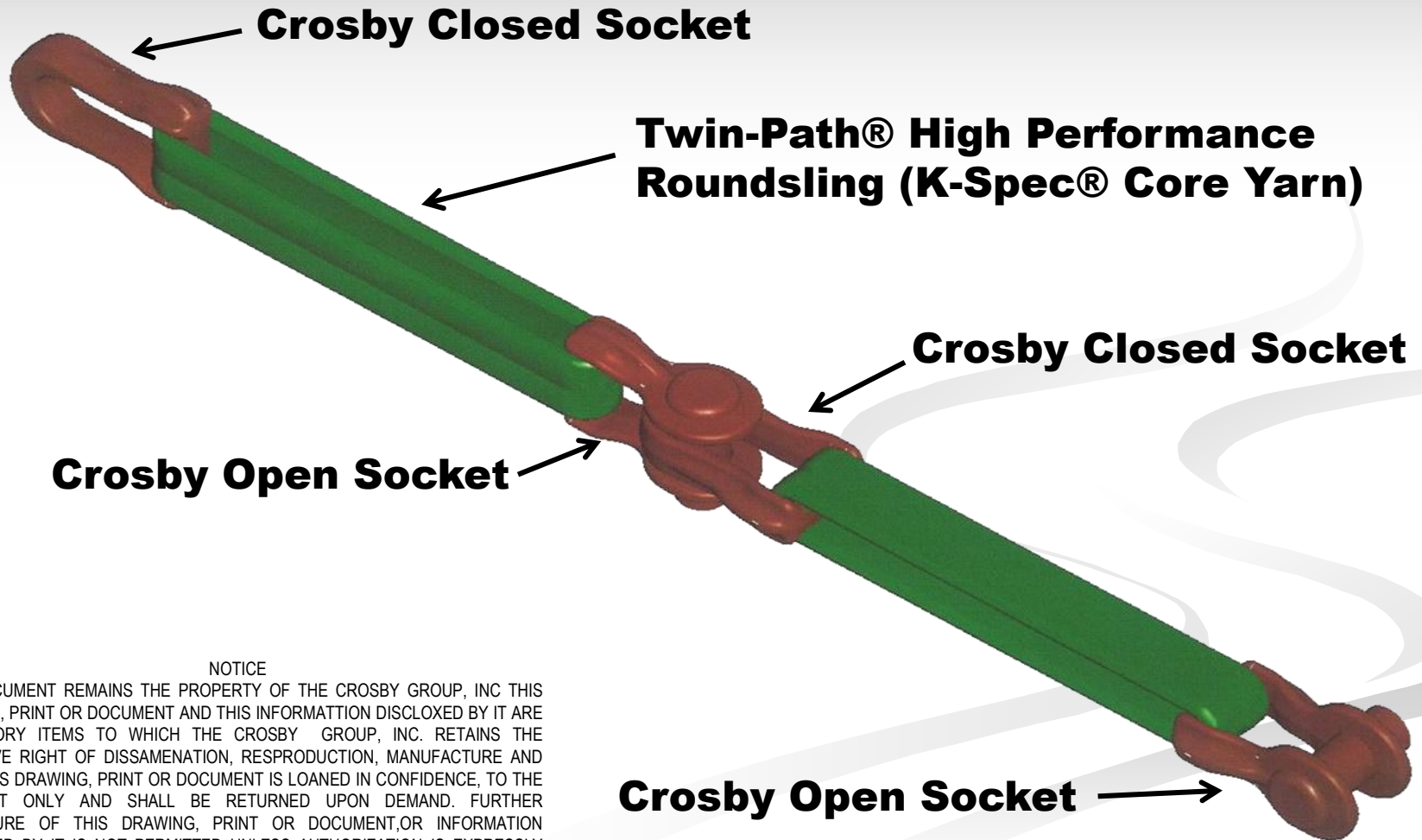
Slingmax® International Locations

8 Fabrication/Repair Stations



Boom Pendant Assembly

Rated for 15 metric tons – 5/1 D/F

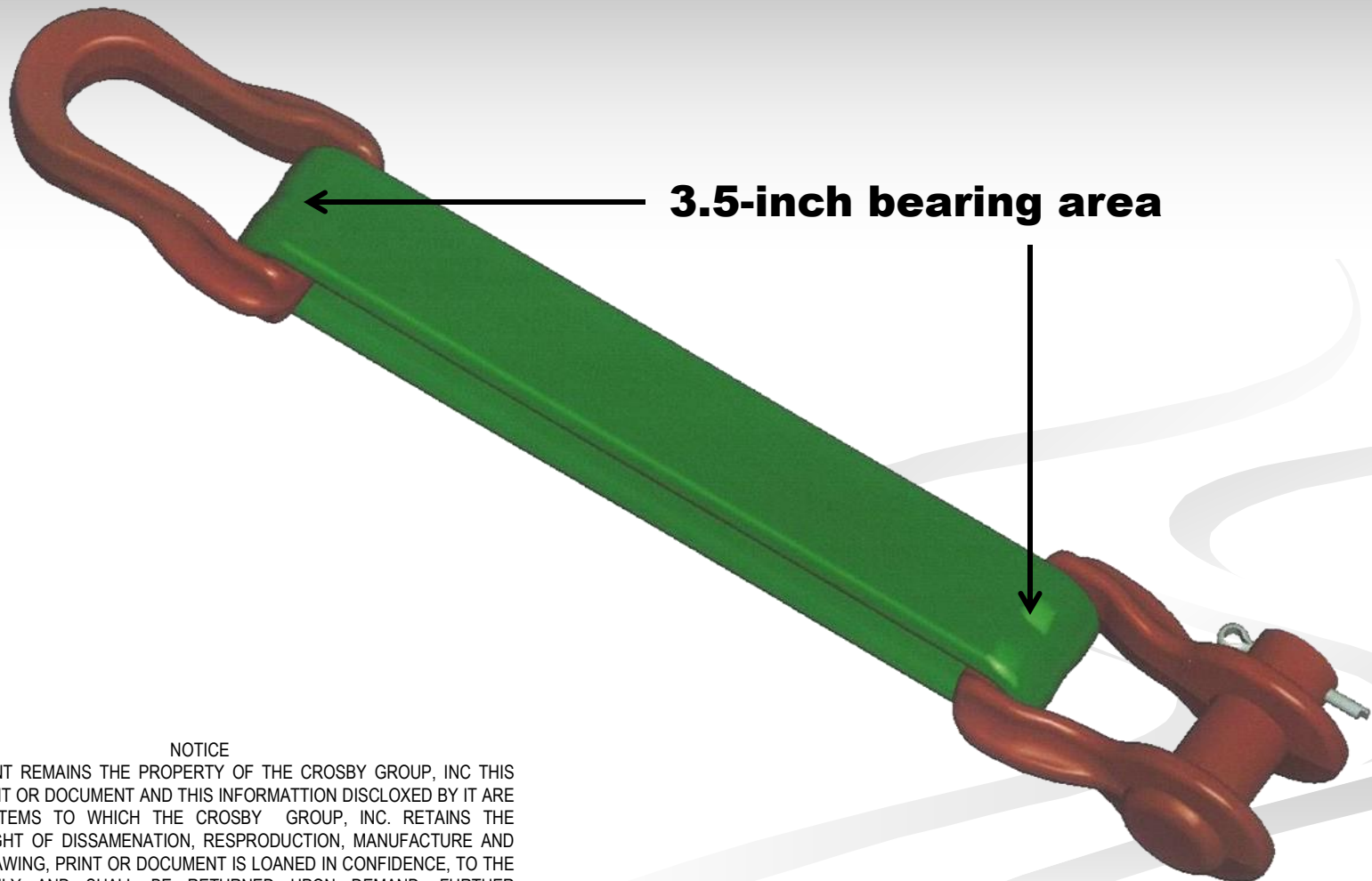


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Boom Pendant Assembly

Rated for 15 metric tons – 5/1 D/F



3.5-inch bearing area

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Why Twin-Path Slings for Boom Pendants?

- **Less weight (4 x's lighter)**
- **Save \$ on over the road costs**
- **Simple Sling Inspection**
- **Patented "Check-Fast®" inspection system**
- **Reusable Crosby End Fittings**
- **Shock absorber (dampening effect)**
- **No maintenance (no lube)**
- **Won't rust, excellent chemical resistance**
- **Repairable / All proof tested**
- **Exact length tolerances**
- **Won't emit static charge**
- **Twisting is no problem**
- **Service life 3-5x's longer**
- **Can change bearing points to extend service life**
- **Store in job box / cab**
- **Longer lengths (60') less fittings = less \$ and weight**
- **Over 20 years success in field**
- **Used by Nuclear, Military, refineries, everywhere.**
- **Worldwide service centers**
- **Best covers, best core yarn and best / only internal inspection device**
- **Can start right away**

Proven Safety Record (25 years & Counting)

- **Twin-Path® Slings first introduced in 1988.**
- **First roundsling in the world to contain “High Performance” Fiber**
- **Previously, all were polyester**
- **Slingmax® is the first in the world to use a blended fiber for tension member (K-Spec)**



Advantages of Twin-Path® **Boom Pendants**

Each sling rated for 50-Tons x 20ft. Length.

44 lbs.



400 lbs.



Twin-Path 1/4 the Weight of Wire

- **20-ft. Twin-Path® Sling**
- **16-Ton VRC- 5/1 - D/F**
- **.72 lbs / ft.**
- **20 ft. length= 14.4 lbs.**
- **Fittings presumably lighter**
- **20-ft. length 1.25” EIP (IWRC Wire Rope)**
- **16 Ton VRC - 5/1 - D/F**
- **2.89 lbs. / ft.**
- **20 ft. length = 57.8 lbs.**
- **Fittings presumably heavier (resin / Wirelock, swaged)**

Reduced Transportation Costs

(These are 100' long slings- 50-Ton VRC)

- **Twin-Path® Slings are flatter, can be rolled to fit into smaller containers- Helicopters**
- **Easier to transport, connect, use and store.**



Advantages of Twin-Path® Boom Pendants

**Can be made to exact
length tolerances
regardless of capacity.**

**Less than 1% stretch
at capacity.**

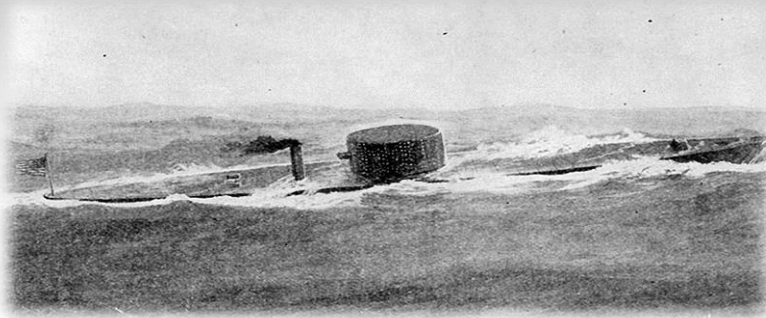
(Same as wire rope)



Advantages of Twin-Path® Boom Pendants

- They don't rust**
- No maintenance**
- No lubrication**

**Impervious to sea
water and most
chemicals including
acids**



**US Navy Raising
“Gun Turret” from
“US Monitor”-**



Advantages – Twin-Path® Boom Pendants

Chemical Resistance

Chemical Resistance of K-Spec® Core Yarn

Available only in Twin-Path® Extra Slings

Strength Retention After Chemical Immersion of K-Spec® Core Yarn

	<u>6 Mos.</u>	<u>2 Yrs.</u>
Seawater	100 %	100%
Hydraulic Fluid	100 %	100%
Kerosene	100 %	100%
10% Detergent Solution	100 %	100%
Gasoline	100 %	100%
Toluene	100 %	96%
Glacial Acetic Acid	100 %	100%
1M Hydrochloric Acid	100 %	100%
5M Sodium Hydroxide	100 %	100%
Ammonium Hydroxide (29%)	100 %	100%
Perchloroethylene	100 %	100%
Clorox Bleach	91 %	73%
Hypophosphite Solution (10%)	100 %	*No Data
Nitric Acid (50% by Volume)	97 %	*No Data
Sulfuric Acid (50% by Volume)	100 %	*No Data
Phosphoric Acid (50% by Volume)	95 %	*No Data

Advantages of Twin-Path® Boom Pendants

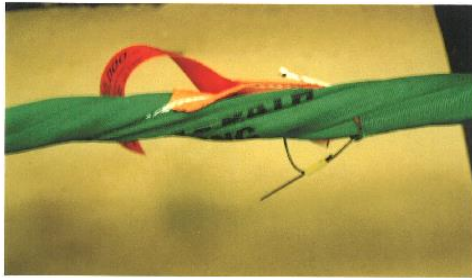
- **Twin-Path® Slings will not emit static charge**
- **Reduced Conductivity**

**45-Ton Space
Shuttle Booster**

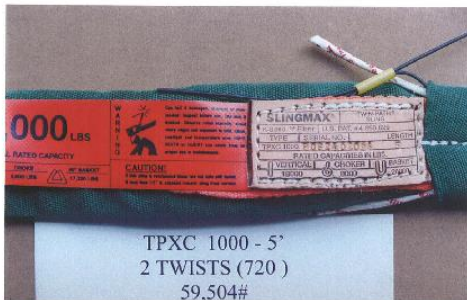


Connect pendants on plane every time. (can twist to make connection)

Twin-Path® Sling Twist Testing- 2002



PHOTOGRAPH #7
TPXC 1000 SLING IN TESTING MACHINE WITH 2 TWISTS IN 5'



PHOTOGRAPH #8
TPXC 1000 SLING AFTER TESTING - TWISTS IN 5'

Breaking strength increases up to 1.0 twists per ft.

"TWIST" TESTS TPXC 10000 SLINGS

A series of ultimate breaking strength tests was conducted on six, 5' TPXC 1000 slings. One exemplar breaking strength test was conducted to determine actual ultimate strength in an untwisted condition, while the remaining five slings were pulled to breaking strengths with varying amounts of twists.

SAMPLE	NO. OF TWISTS	EXPOSED LENGTH OF TELL-TAILS	TENSILE LOAD
B062402092	NONE	3.5"	0#
		3.5"	10,000#
		3.5"	20,000#
		3.375"	30,000#
		3.125"	40,000#
		0" & 1.75"	ULT. B.S. = 58,093#
B062402094	2 Twists .4 Twist/ft. 144" /ft.	2.75" & 3.0"	ULT. B.S. = 59,504#
B062402095	4 Twists .8 Twist/ft. 288" /ft.	0" & 3.375"	ULT. B.S. = 70,821#
B062402097	4 Twists .8 Twist/ft. 288" /ft.	3.375" & 3.375"	ULT. B.S. = 71,357#
B062402096	5 Twists 1 Twist/ft. 360" /ft.	3.0" & 3.375"	ULT. B.S. = 63,089#
B062402093	6 Twists 1.2 Twists/ft. 432" /ft.	0.75" & 3.0"	ULT. B.S. = 59,300#

Donald L. Fellow
Donald L. Fellow - P.E.
Engineering Consultant
July 24, 2002

Advantages – Twin-Path® Boom Pendants

(Can twist to make connection)

Twin-Path® Sling Twist Testing – 2002



PHOTOGRAPH #7

TPXC 1000 SLING IN TESTING MACHINE WITH 2 TWISTS IN 5'



PHOTOGRAPH #8

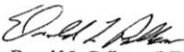
TPXC 1000 SLING AFTER TESTING – TWISTS IN 5'

Breaking strength increased up to 1.0 twists per ft.

“TWIST” TESTS TPXC 10000 SLINGS

A series of ultimate breaking strength tests was conducted on six, 5' TPXC 1000 slings. One exemplar breaking strength test was conducted to determine actual ultimate strength in an untwisted condition, while the remaining five slings were pulled to breaking strengths with varying amounts of twists.

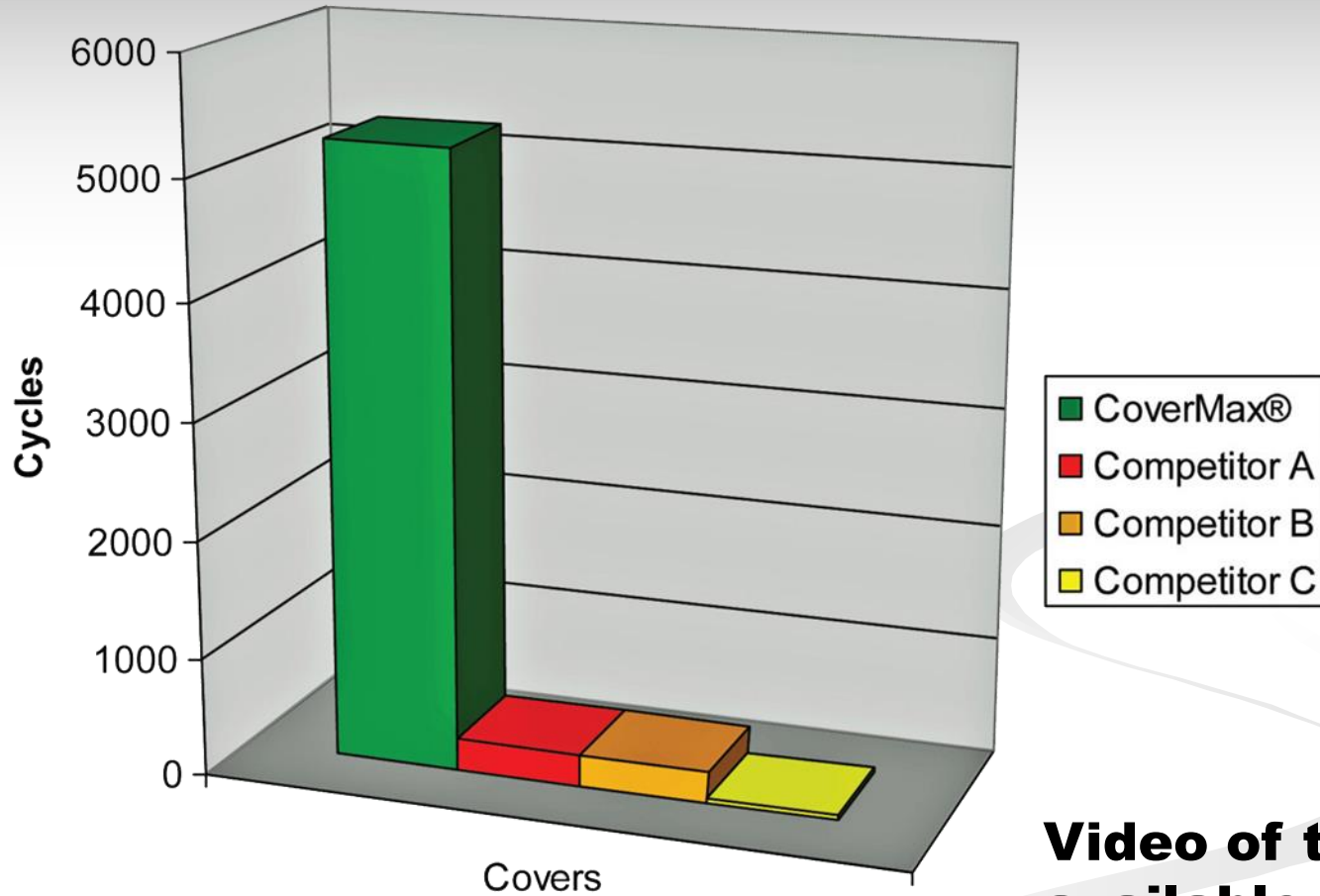
SAMPLE	NO. OF TWISTS	EXPOSED LENGTH OF TELL-TAILS	TENSILE LOAD
B062402092	NONE	3.5" 3.5" 3.5" 3.375" 3.125" 0" & 1.75"	0# 10,000# 20,000# 30,000# 40,000# ULT. B.S. = 58,093#
B062402094	2 Twists .4 Twist/ft. 144° /ft.	2.75" & 3.0"	ULT. B.S. = 59,504#
B062402095	4 Twists .8 Twist/ft. 288° /ft.	0" & 3.375"	ULT. B.S. = 70,821#
B062402097	4 Twists .8 Twist/ft. 288° /ft.	3.375" & 3.375"	ULT. B.S. = 71,357#
B062402096	5 Twists 1 Twist/ft. 360° /ft.	3.0" & 3.375"	ULT. B.S. = 63,089#
B062402093	6 Twists 1.2 Twists/ft. 432° /ft.	0.75" & 3.0"	ULT. B.S. = 59,300#


Donald L. Pellow - P.E.
Engineering Consultant
July 24, 2002

Roundsling Cover Abrasion Testing



Sling Cover Abrasion Test Results



Video of this testing is available upon request.

Crosby Cycle Testing 2006

Technical Bulletin #9 on Website

- **TP sling rated for 25,000 lbs. pulled to 37,500 lbs. over Crosby 1-3/8" Shackle Bows .**
- **50,000 cycles at 50% overload.**
- **50,000 cycles = 1 lift per hour, every hour, every day for 6 years.**

Advantages – Twin-Path® Boom Pendants

Fatigue and Abrasion Resistance



Close-up of tag on sling being tested



Photograph of the slings once testing is completed



Photograph of the inside end of sling after cycle testing has been completed



Sling #2 after ultimate load testing



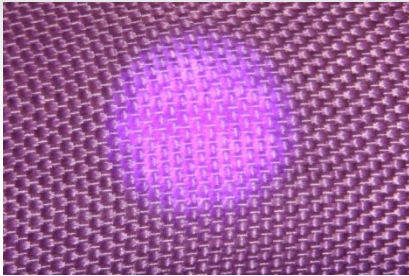
Close-up of each end of sling #2 after ultimate testing

- Bearing Points Never Changed.
- After testing, slings still passed inspection.
- Inspection devices still operable.
- Slings then broken on shackle bows- reached over 4:1 D/F.
- Wire rope tested over 2” straight pins in separate testing broke at bearing point after 25,000 cycles.

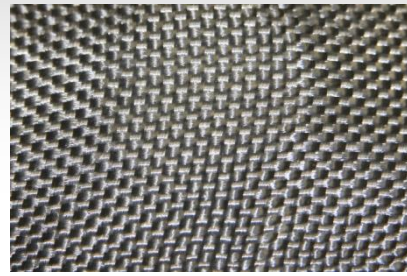
Synthetic Roundslings

Ultra-Violet (UV) Degradation

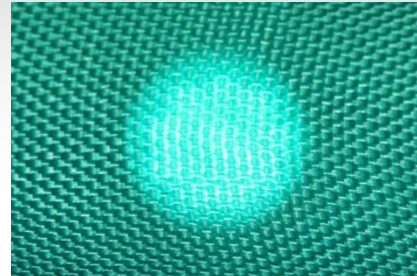
Which covers best protect from UV Degradation?



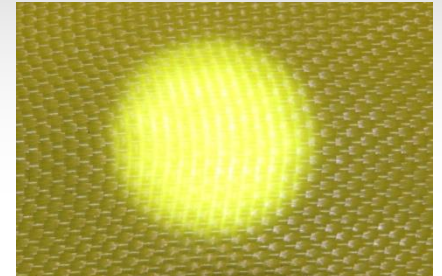
DBL Purple Poly



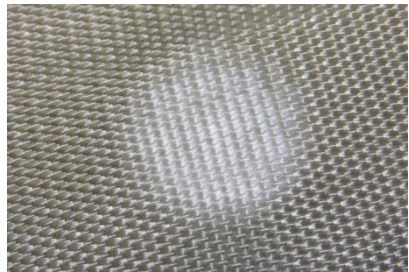
DBL Black Poly



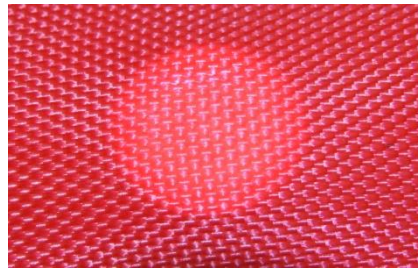
DBL Green Poly



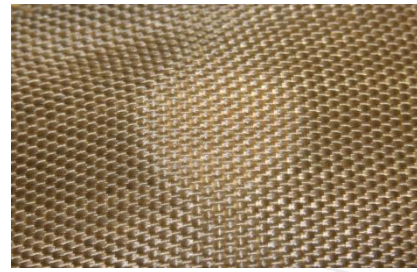
DBL Yellow Poly



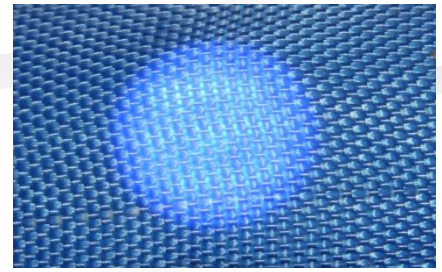
DBL Gray Poly



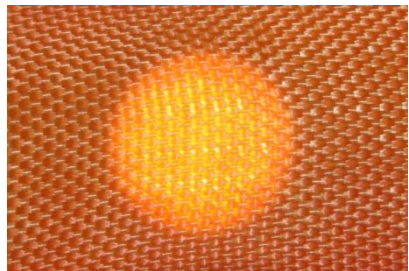
DBL Red Poly



DBL Brown Poly



DBL Blue Poly



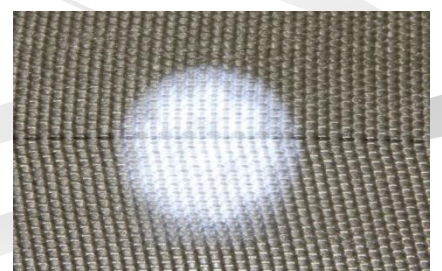
DBL Orange Poly



CoverMax® Green



SGL Clear Poly




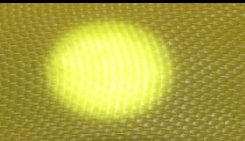
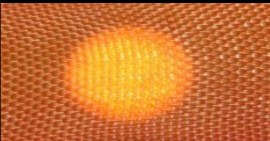


SGL Gray Bulk Nylon

Advantages – Twin-Path® Boom Pendants

UV Degradation Resistance

Synthetic Roundslings

Slingmax® UV Degradation Testing Results

Fiber Type	No UV Exposure	No Cover	Clear Cover	DBL Yellow Poly Cover	DBL Org-Red Poly Cover	DBL Black Poly Cover	CoverMax® Cover
	Baseline	Percentage of Strength <u>LOST</u> at 500 Hours of UV Exposure to Covers/Fiber					
Polyester	100%	36%	46%	12%	9%	5%	2%
Aramid	100%	28%	38%	26%	27%	9%	2%
K-Spec®	100%	12%	N/A	N/A	N/A	N/A	1.13%
							

- Twin-Path® slings do not lose strength due to UV exposure
- Most all other roundslings in the world do lose strength when exposed to UV- some up to 40% or more.

Advantages – Twin-Path® Boom Pendants

UV Degradation Resistance

Southern Weaving UV Quick Test



Picture is yellow 9800GN nylon web sling material protected by Slingmax® Covermax® roundsling tubing.

The exposed webbing faded to white after 334 hours of UV exposure. When the nylon web was pulled out of the protective Slingmax® cover, you can see the original yellow color remains. It shows no UV degradation to the protected webbing.

Rifled Cover - US Patent # 7,926,859



Helically laid (rope-like) core adds 15% higher breaking strength vs. parallel laid core yarns.



Check-Fast® Inspection

US Patent # 7,661,737

Pre-failure Warning Indicator for Roundslings

- **Warning indicator reacts at a pre-determined force well before damage can occur to the load bearing core.**
- **Provides a visual warning.**
- **Provides an audible warning.**
- **Can determine overload.**
- **Can determine abrasion/fatigue damage.**

