Twin-Path® Synthetic Roudsling Boom Pendants
Slingmax® Rigging Solutions (North America)
36 Fabrication / Repair / Testing Facilities
Slingmax® International Locations
8 Fabrication/Repair Stations
Boom Pendant Assembly
Rated for 15 metric tons – 5/1 D/F

Crosby Open Socket

Crosby Closed Socket

Twin-Path® High Performance Roundsling (K-Spec® Core Yarn)

Crosby Closed Socket

Crosby Open Socket
**Boom Pendant Assembly**

*Rated for 15 metric tons – 5/1 D/F*

**Twin-Path® Boom Pendants**

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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)

- 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

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

*No Data indicates that the chemical resistance of this component has not been tested.
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**

Breaking strength increases up to 1.0 twists per ft.

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**“TWIST” TESTS**

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

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>NO. OF TWISTS</th>
<th>EXPOSED LENGTH OF TAIL-TAILS</th>
<th>TENSILE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>B062402092</td>
<td>None</td>
<td>3.5'</td>
<td>60'</td>
</tr>
<tr>
<td>B062402094</td>
<td>2 Twists</td>
<td>2.75' &amp; 3.0'</td>
<td>ULT. B.S. = 58,093'</td>
</tr>
<tr>
<td>B062402095</td>
<td>4 Twists</td>
<td>144' ft.</td>
<td>ULT. B.S. = 59,504'</td>
</tr>
<tr>
<td>B062402097</td>
<td>4 Twists</td>
<td>337' ft.</td>
<td>ULT. B.S. = 70,821'</td>
</tr>
<tr>
<td>B062402098</td>
<td>4 Twists</td>
<td>3.375' &amp; 3.375'</td>
<td>ULT. B.S. = 71,357'</td>
</tr>
<tr>
<td>B062402099</td>
<td>5 Twists</td>
<td>3.0' &amp; 3.575'</td>
<td>ULT. B.S. = 63,080'</td>
</tr>
<tr>
<td>B062402100</td>
<td>6 Twists</td>
<td>0.75' &amp; 3.0'</td>
<td>ULT. B.S. = 59,109'</td>
</tr>
</tbody>
</table>

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

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Twin-Path® Boom Pendants
Advantages – Twin-Path® Boom Pendants
(Can twist to make connection)

Twin-Path® Sling Twist Testing – 2002

Breaking strength increased up to 1.0 twists per ft.

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

PHOTOGRAPH #8
TPXC 1000 SLING AFTER TESTING – TWISTS IN 5’

“TWIST” TESTS
TPXC 1000 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 un twisted condition, while the remaining five slings were pulled to breaking strengths with varying amounts of twists.

<table>
<thead>
<tr>
<th>SAMPLE</th>
<th>NO. OF TWISTS</th>
<th>EXPOSED LENGTH OF TELL-TAILS</th>
<th>TENSILE LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>B062402092</td>
<td>NONE</td>
<td>3.5”</td>
<td>0#</td>
</tr>
<tr>
<td>B062402094</td>
<td>2 Twists. .4 Twist/ft. 144”/ft.</td>
<td>3.5”</td>
<td></td>
</tr>
<tr>
<td>B062402095</td>
<td>4 Twists. .8 Twist/ft. 288”/ft.</td>
<td>3.75”</td>
<td></td>
</tr>
<tr>
<td>B062402097</td>
<td>4 Twists. .8 Twist/ft. 288”/ft.</td>
<td>0” &amp; 3.75”</td>
<td></td>
</tr>
<tr>
<td>B062402096</td>
<td>5 Twists. 1 Twist/ft. 360”/ft.</td>
<td>3.75” &amp; 3.375”</td>
<td></td>
</tr>
<tr>
<td>B062402093</td>
<td>6 Twists. 1.2 Twists/ft. 432”/ft.</td>
<td>0.75” &amp; 3.0”</td>
<td></td>
</tr>
</tbody>
</table>

ULT. B.S. = 58,093#
ULT. B.S. = 59,004#
ULT. B.S. = 70,821#
ULT. B.S. = 71,357#
ULT. B.S. = 63,089#
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

- 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

Twin-Path® Boom Pendants
Advantages – Twin-Path® Boom Pendants
UV Degradation Resistance

Synthetic Roundslings
Slingmax® UV Degradation Testing Results

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

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