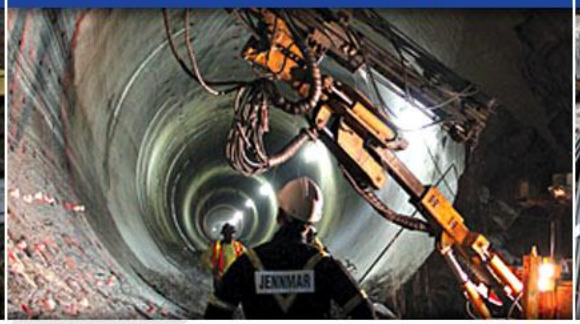
JENNMAR

LEADING THE WAY IN GROUND CONTROL TECHNOLOGY

MINING
COAL AND HARDROCK

TUNNELING
TRANSPORTATION AND SERVICE



CIVIL
ABOVE GROUND SOIL STABILIZATION

New Ground Support Products For Longwall Gate Roads

For

2013 LONGWALL USA

Pittsburgh, PA
May 9, 2013

JENNMAR | JENNMAR SPECIALTY PRODUCTS | JENNCHEM | JM STEEL | J-Lok | KMS KEYSTONE MINING SERVICES

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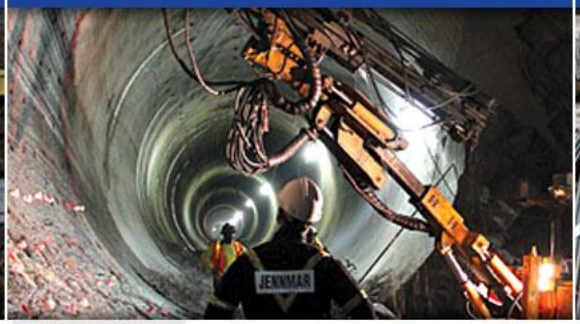

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New Ground Support Products For Longwall Gate Roads

By:

Dakota Faulkner

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New Products Outline

1. Fully Grouted Cable Bolt (FGCB)
2. INSTáL® Tensionable Cable Bolt
3. Standing Support Technologies
   - J-Crib - Pumpable Cribs
   - Rapid Installation Props (RIP)
   - J-Sand Props
4. Non-Metallic Bolt and Plates
5. Questions/Open Discussion

FULLY GROUTED CABLE BOLT

What is the FGCB?

- A cable bolt that can be injected with polyurethane (PUR) to fully encapsulate the cable bolt and drill hole.

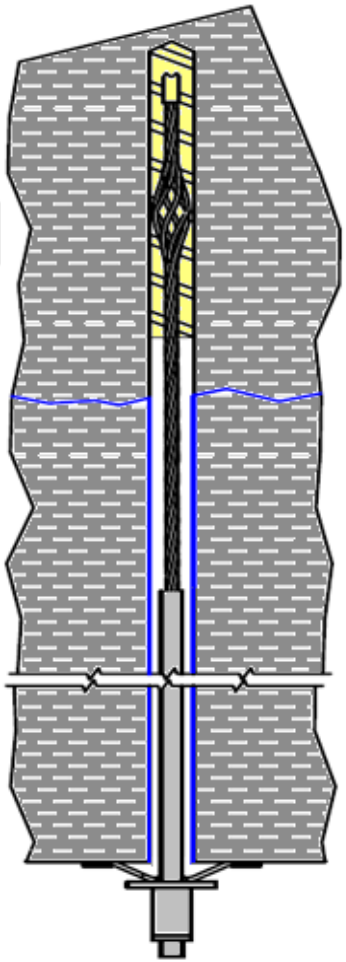
How Does It Work?

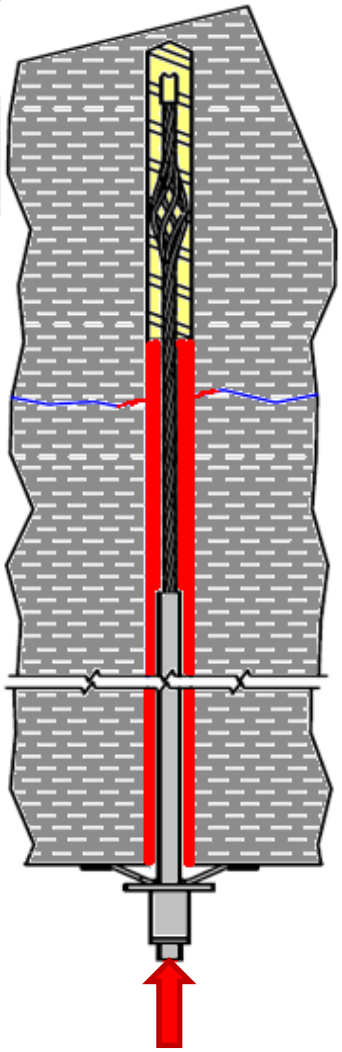
- Modified drive head to allow injection of PUR.
- Addition of rubber packer to pressurize drill hole.

Typical Uses

- Long term corrosion protection.
- Consolidate fractured or laminated strata.
- Water stoppage.

FGCB Diagram





Fully Grouted Cable Bolt

- Available in:
  - *0.6” (30 ton) or 0.7” (40 ton) cable.*
  - Non-Tensioned or Tensionable (INSTáL CC).

- Typically:
  - Installed in 1” or 1-3/8” drill hole.
  - Point anchored with 4-5 eq. feet of resin.
  - Standard 1-1/8” drive nut.
  - Standard minimum length of 8’.

CASE STUDY

(Deteriorating Roof Conditions)

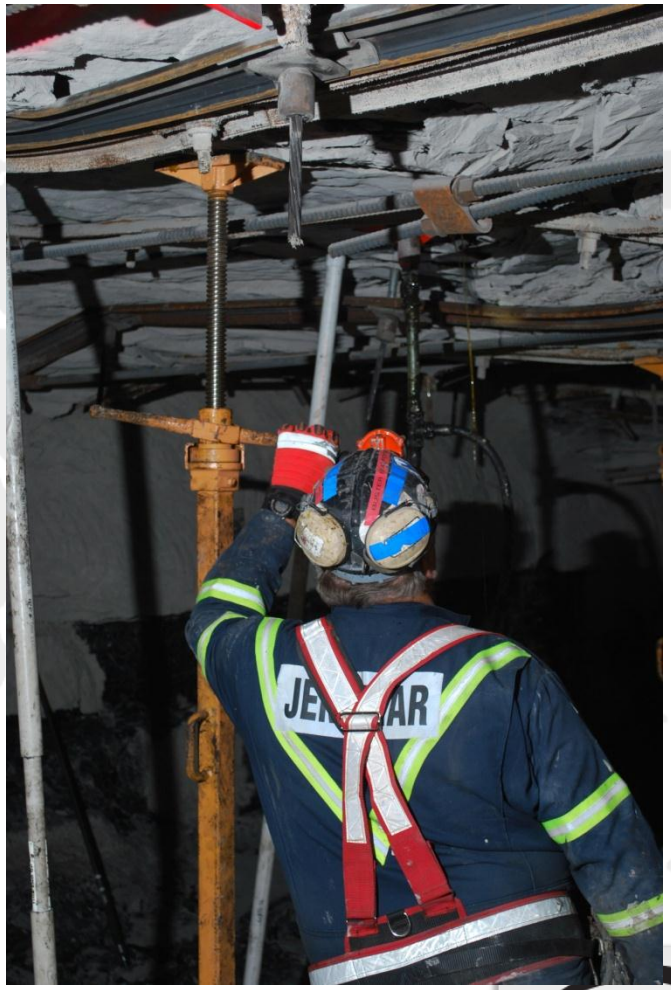
FGCB Used for Deteriorating Roof Conditions

- Location - Eagle seam
- Mining method - Longwall
- Previously mined headgate began to take excessive weight and roof conditions rapidly began to deteriorate.

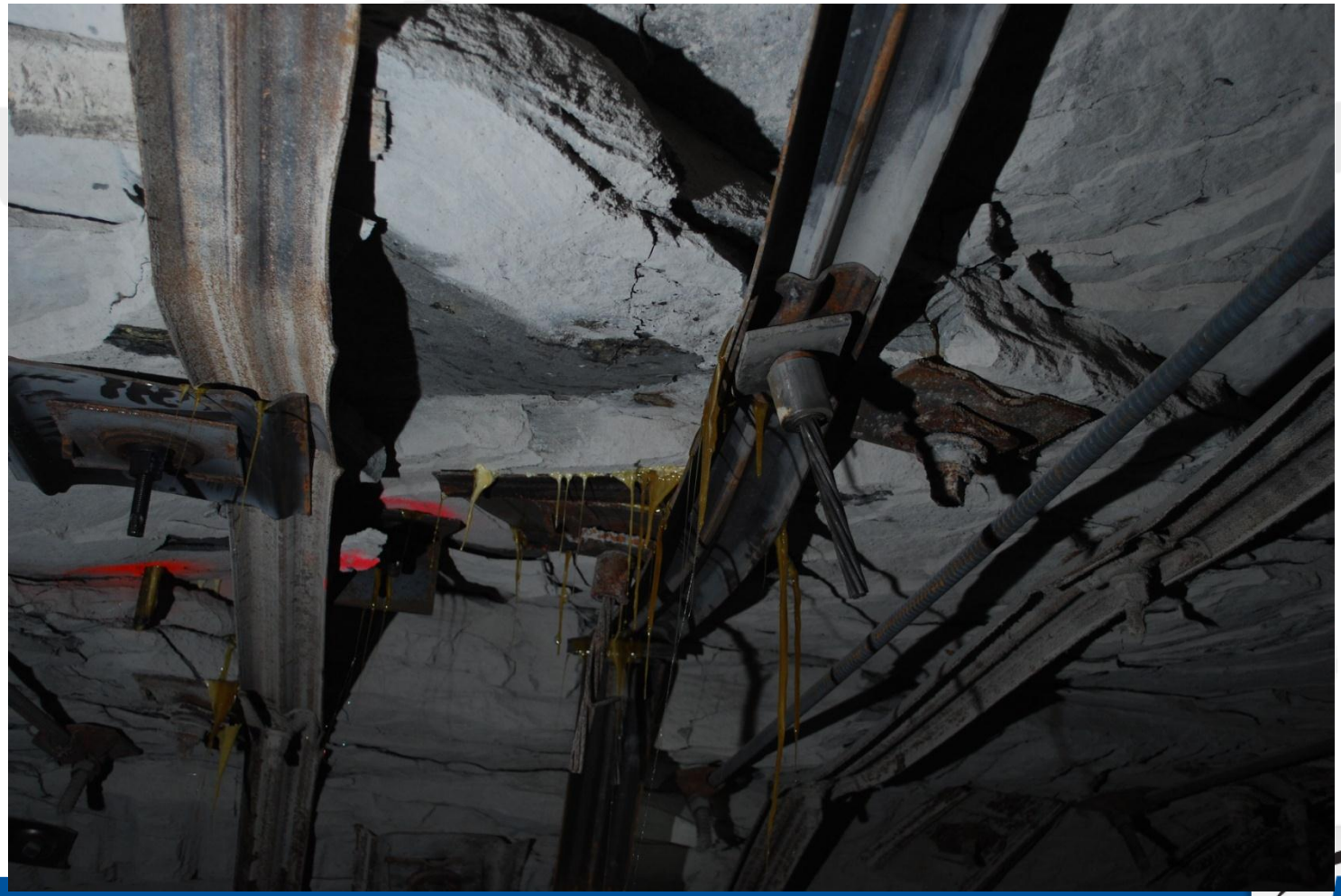
JENNMAR Recommended the FGCB

- JENNMAR's technical engineers made an on-site visit and inspected the area.

- Recommended the FGCB due to its ability to inject the roof strata with PUR along with the added strength of a cable bolt.



Injected PUR Migrating Through the Cracks in the Strata



FGCB Successfully Utilized to Halt the Deteriorating Roof Conditions

Scoped Drill Hole

Before injection.

After injection.

INSTáL® TENSIONABLE CABLE BOLT SYSTEMS

INSTáL® TENSIONABLE CABLE BOLT

- INSTáL® CC - 4’ tensionable zone.

- INSTáL® CB - tensionable zone below bail shell.

*Now available in a Fully Grouted model.

New Designed Bail Type Expansion Anchor (Shell)

- New serration design improves anchorage capacity.
- Improved resin channels to reduce installation pressure.

INSTáL® Cable Bolt Specifications

- *0.6” (30 ton) or 0.7” (40 ton) cable.*
- Simple and fast installation.
- Provides immediate support and confinement to roof.
- Consistent applied tension.
- Can be implemented as part of primary roof support system.
- Tension Range – 6,000 lbs minimum.
- *Can be used in conjunction with PUR injection.

FULLY GROUTED INSTáL CC
(Tensionable PUR Injectable Cable Bolt)

FULLY GROUTED INSTáL CC

- Now available in 0.6” (30 ton) and 0.7” (40 ton).
- Tension Range – 6,000 lbs minimum.
- Can be implemented as part of primary roof support system and injected at any time.

Case Study - INSTáL CC

(Longwall Setup Face)

Longwall Setup Face

- Eagle Seam
- Full-width setup face.
- Laminated sandstone roof susceptible to damage with very little roof deflection.
- Significant roof movement observed in first half of setup face due to slow installation of post-tensioned cables.
- INSTáL® Cables recommended to provide immediate support and reduce roof deflection for second half of setup face.

Longwall Setup Face

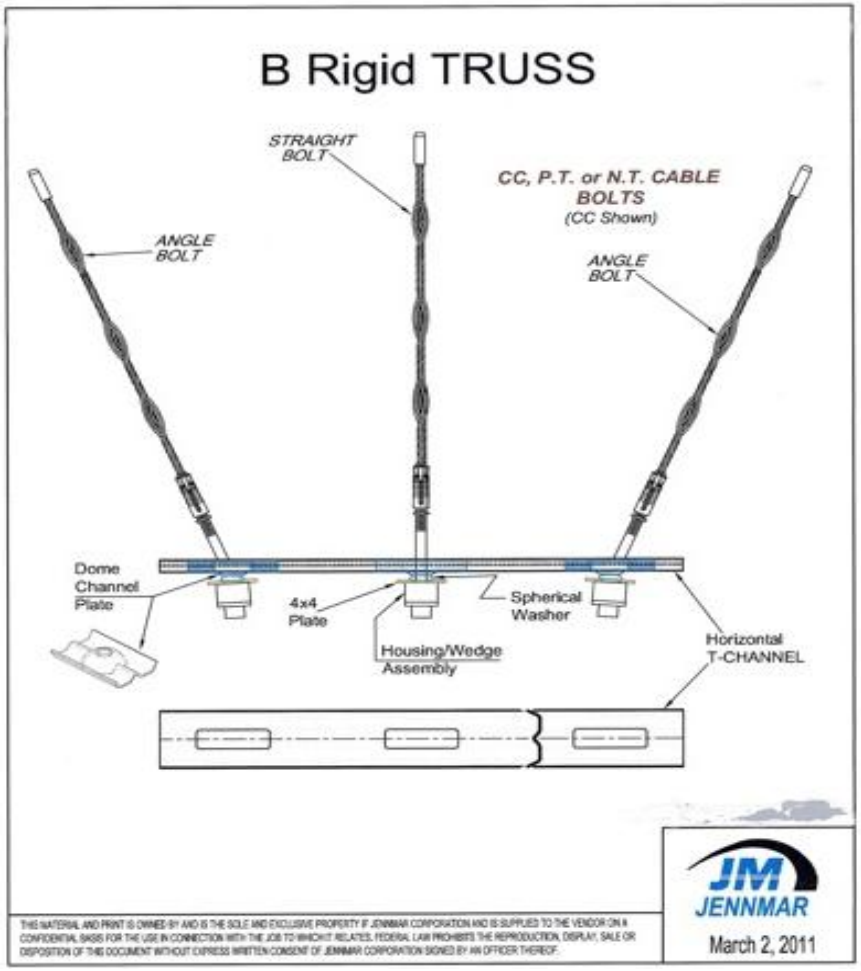
Post-Tensioned Cables

INSTáL ® CC Cables

Roof location 100 ft after switch from Post Tensioned Cable Bolts to INSTáL ® CC cable bolts.

B-RIGID TRUSS SYSTEM with INSTáL® CC

B-Rigid Truss System Overview



- Jennmar T-Channel used in conjunction with Jennmar Cable Bolts.
- Outside bolts are angled over ribs into undisturbed strata.
- Replaces conventional truss systems.

Advantages of B-Rigid Truss

- Simple Installation—uses standard roof support materials with no special installation tools needed.
- Conforms to roof—no gaps between channel and roof line.
- Provides confinement to immediate roof for better roof support.
- Allows individual cables to interact.
- Can be used with all cable bolting systems.

Example of B-Rigid Truss in Use

Example of B-Rigid Truss in Use

Example of B-Rigid Truss in Use

New Standing Support Technologies

J-CRIB® Pumpable Crib

J-CRIB® Pumpable Crib

- J-CRIB® is a specialized pumpable cement and containment bag which replaces conventional timber cribs in longwall tailgates and bleeder headings.
- Two part system consisting of Part A and Part B, which when mixed together rapidly react to produce a load bearing mine roof support.
- Typical diameters and peak capacities-
  - 24” (610mm) - 150 tons (135 tonne)
  - 27” (686mm) - 200 tons (181 tonne)
  - 30” (762mm) - 230 tons (209 tonne)

J-CRIB Advantages

- High efficiency mixing and pumping equipment.
- High yield, approximately 90% by volume water.
- Long distance pumping, up to 18,000 ft (5486 m).
- Long pumping life, at least 12 hours.
- Yields controllably to ground pressure.

Conforms and Pressurizes Against the Roof & Floor

- Consistent performance, pressurization of bags ensures good contact with the mine roof and even load bearing capacity.
- Rapid gelling allows bags to be filled completely without additional form work.

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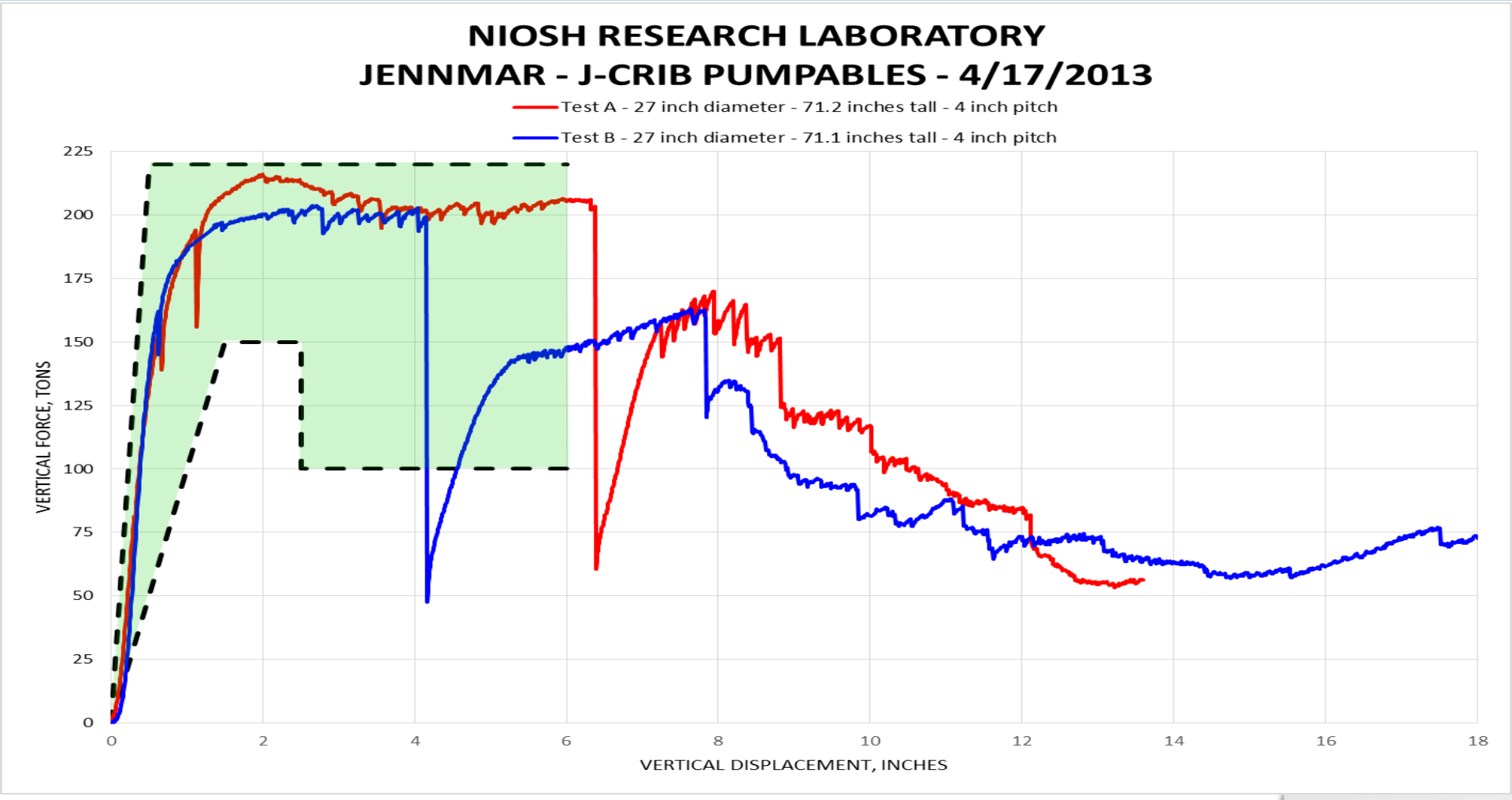
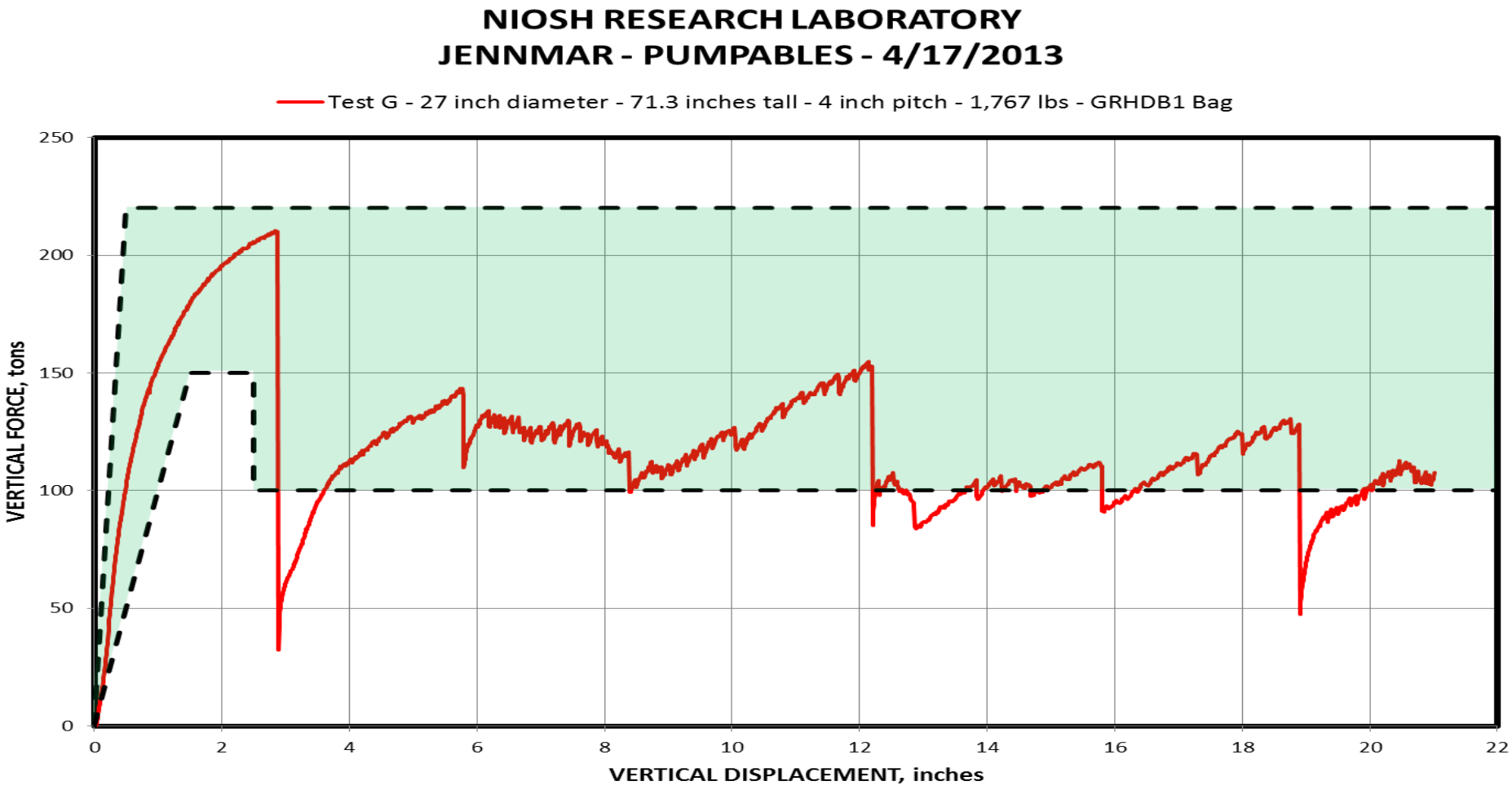
27” Diameter Standard J-CRIB Results



27” Diameter High Deformation J-CRIB Result



Rapid Installation Prop (RIP)

Rapid Installation Prop

- **Designs:**
  - Available in 50 & 100 ton (45 & 91 tonne) capacities.
- **Applications:**
  - Tailgate and bleeder support.
  - Cross-cut and intersection stabilization.
  - Belt line and headgate entry support.
  - Longwall shield recovery.
  - Longwall center entry.
  - CM pillar extraction.
  - Violation prevention.

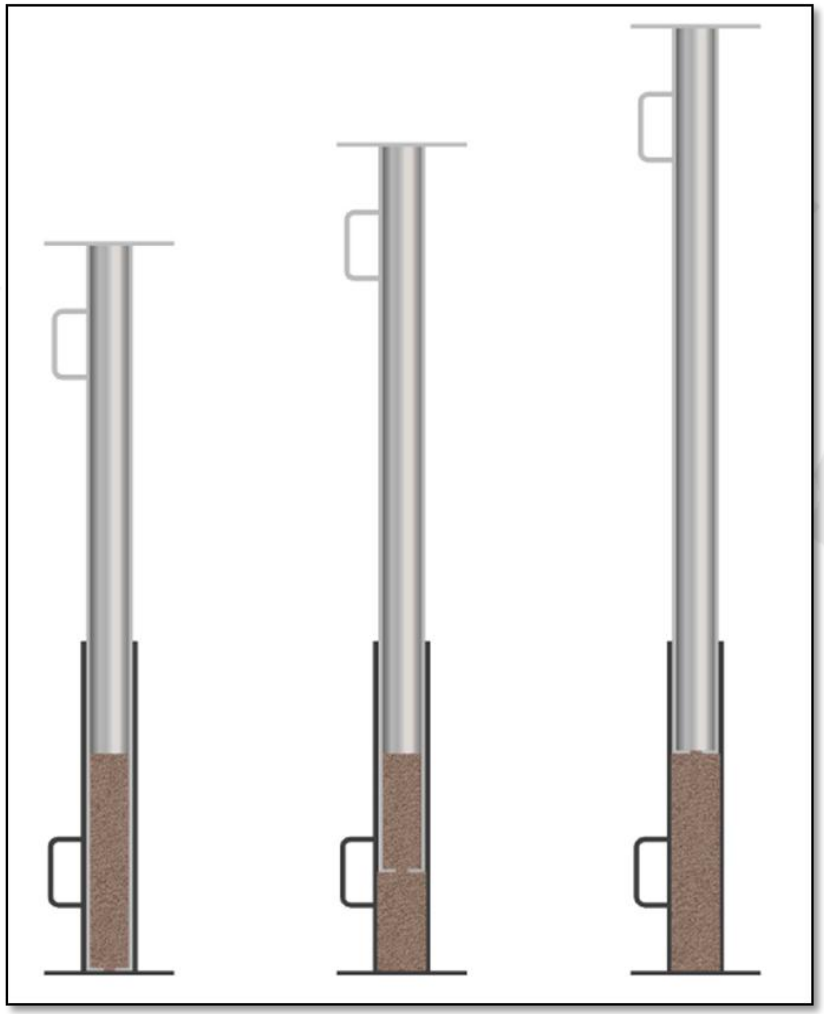
RIP 50 & RIP 100

Technical Data - RIP			
SUPPORT, tons (metric tons)	**TRAVEL, in(mm)**	**PIPE, in (mm)**	**EXTENSION THREAD, in (mm)**
RIP 50 (45)	12 (305)	3 (76)	2.0 (51)
RIP 100 (91)	18 (457)	4 (102)	3.5 (89)

- **ADVANTAGES:**
  - Available in 50 or 100 ton (45 or 91 metric tons) capacities.
  - Single pipe, height can be modified if necessary.
  - Easy screw height adjustment.
  - Piranha top plate engages roof to prevent rotation when tightening.

J-SAND™ PROP

J-SAND PROP



- **Designs:**
  - Available in 30, 60 & 100 ton (27, 54 & 91 tonne) capacities.
  - Yieldable or Non-Yieldable.
- **Applications:**
  - Tailgate and bleeder support.
  - Cross-cut and intersection stabilization.
  - Belt line and heagate entry support.
  - Longwall shield recovery.
  - Longwall center entry.
  - CM pillar extraction.
  - Violation prevention.

Standard J-SAND PROP

- **Advantages**
  - 24 inches of height adjustment.
  - Light, quick and easy to install.
  - No equipment or tools required to install.
  - Cannot be over extended.
  - Available with a variety of head plates.
  - Yieldable versions developed provide additional displacement.

TECHNICAL DATA

J-SAND 30			
SIZE	HEIGHT, ft (m)		WEIGHT, lb (kg)
	COLLAPSED	EXTENDED	
J-SAND 4-6	4 (1.2)	6 (1.8)	53 (24)
J-SAND 5-7	5 (1.5)	7 (2.1)	57 (26)
J-SAND 6-8	6 (1.8)	8 (2.4)	61 (28)
J-SAND 7-9	7 (2.1)	9 (2.7)	65 (29)

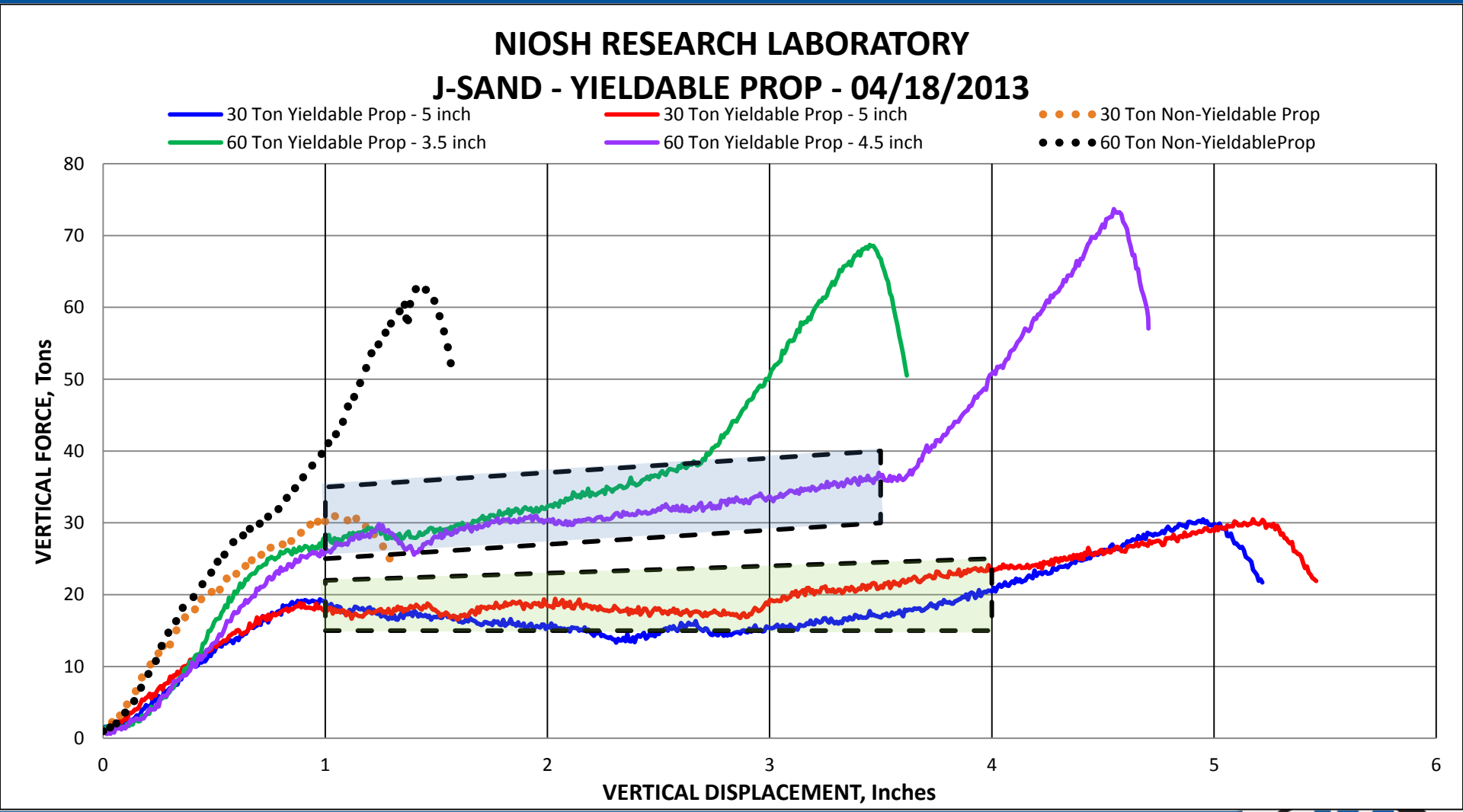
J-SAND 60			
SIZE	HEIGHT, ft (m)		WEIGHT, lb (kg)
	COLLAPSED	EXTENDED	
J-SAND 4-6	4 (1.2)	6 (1.8)	76 (35)
J-SAND 5-7	5 (1.5)	7 (2.1)	82 (37)
J-SAND 6-8	6 (1.8)	8 (2.4)	91 (41)
J-SAND 7-9	7 (2.1)	9 (2.7)	97 (44)

J-SAND 100			
SIZE	HEIGHT, ft (m)		WEIGHT, lb (kg)
	COLLAPSED	EXTENDED	
J-SAND 4-6	4 (1.2)	6 (1.8)	91 (35)
J-SAND 5-7	5 (1.5)	7 (2.1)	102 (46)
J-SAND 6-8	6 (1.8)	8 (2.4)	112 (51)
J-SAND 7-9	7 (2.1)	9 (2.7)	123 (56)

- J-SAND 30
  - Light weight – Up to 32 pounds lighter than a comparable 60 ton J-SAND Prop.
  - Can be easily carried by one man.
- J-SAND 60
  - Light weight – Up to 9 pounds lighter than competing 60 ton props.
  - Over 4” of displacement on yieldable versions.
- J-SAND 100
  - High capacity to minimize roof movement and keep the entry open.
  - Used when the ultimate load bearing support is required.

***Custom sizes are available**

Yieldable J-SAND Props



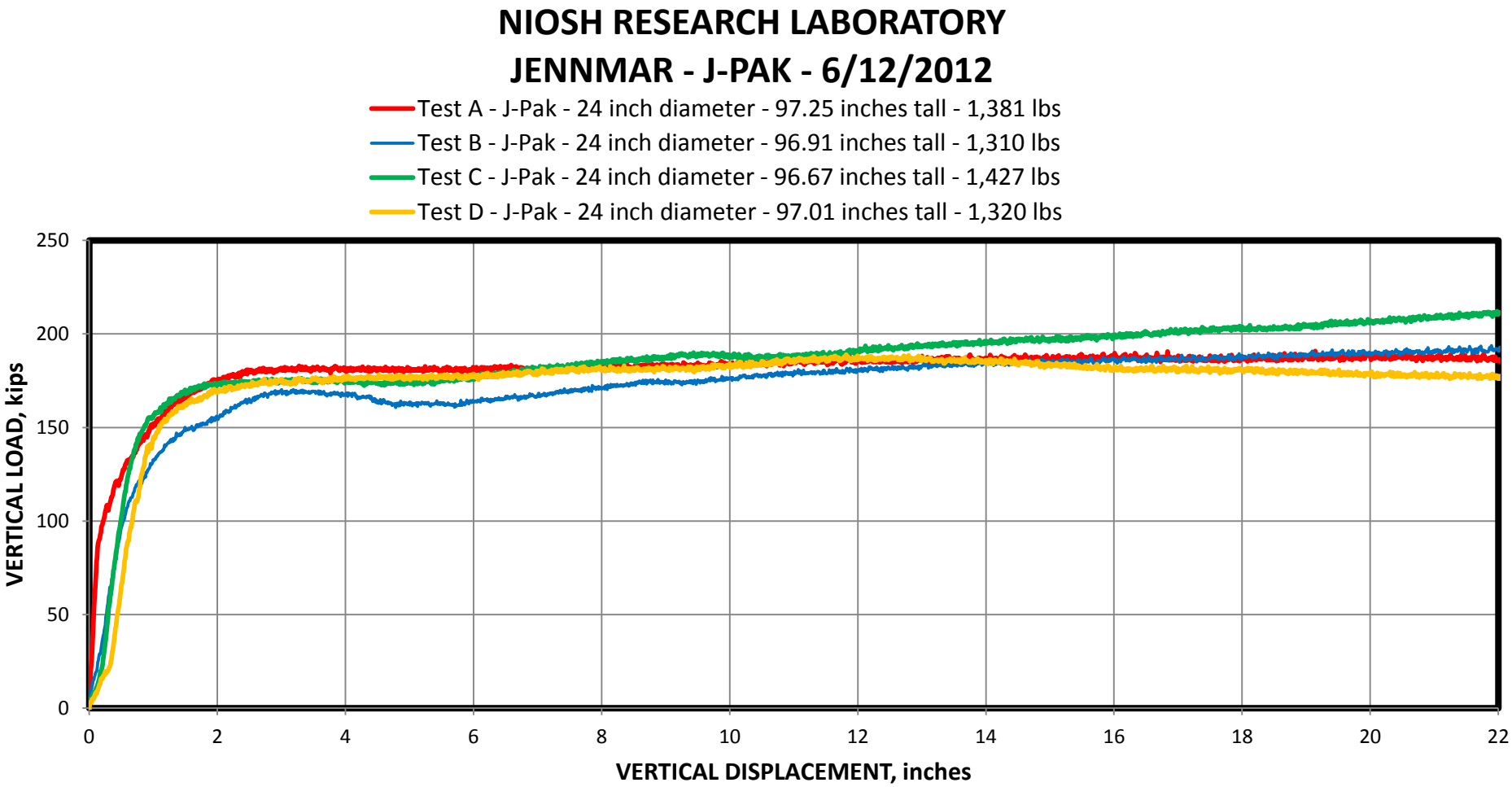
J-PAK

J-PAK

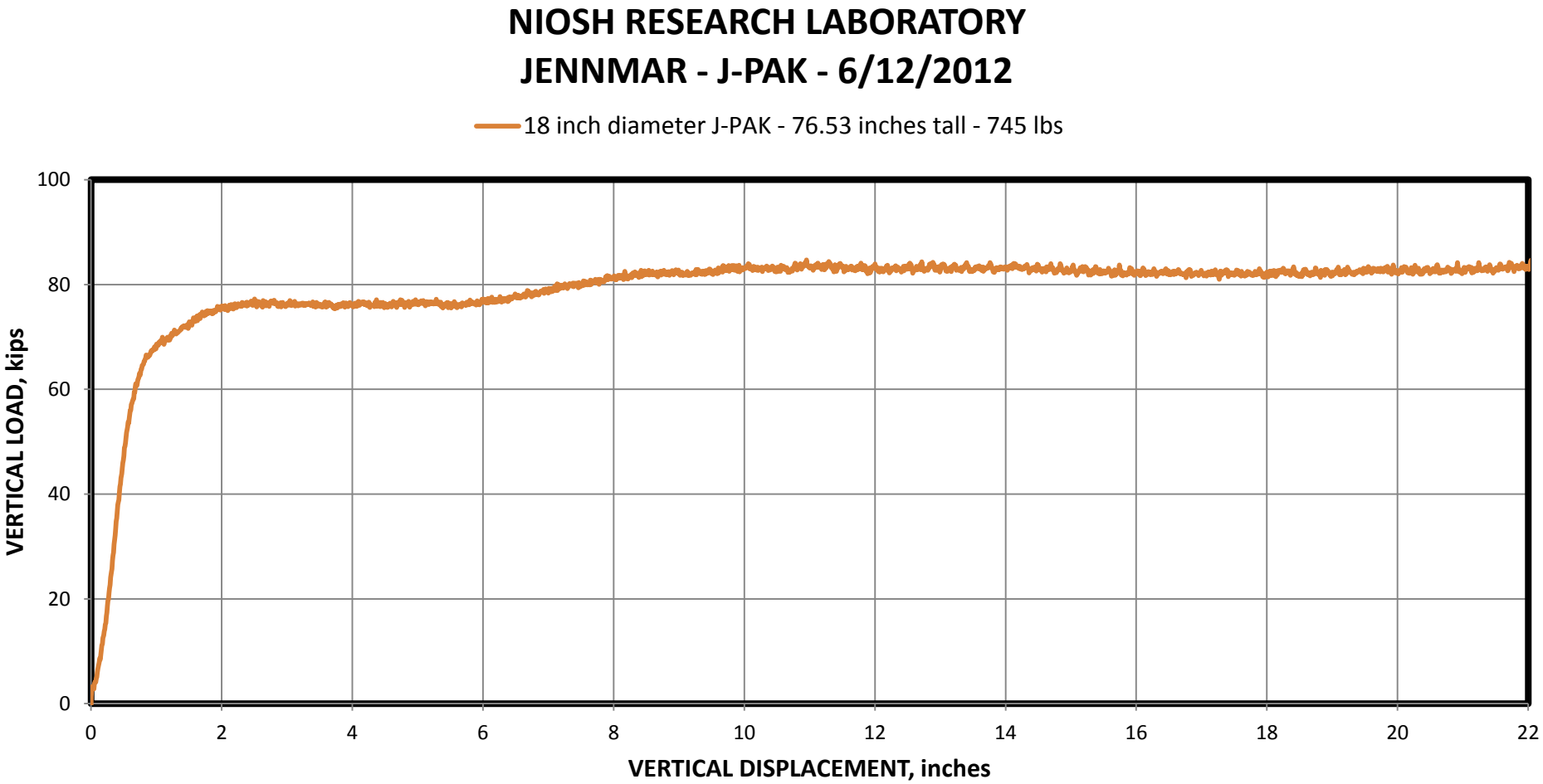
- **Advantages:**
  - Replaces conventional timber cribs in longwall tailgates and bleeders.
  - Sustains peak capacity during yielding.
  - Stable and high yield performance.
  - Withstands lateral displacement.

- **Typical diameters and capacities:**
  - 18” (457 mm) ; 70 - 80 tons (64 - 73 tonne).
  - 24” (610 mm) ; 90 - 100 tons (82 - 91 tonne).

24” J-PAK Results



J-PAK Test Results



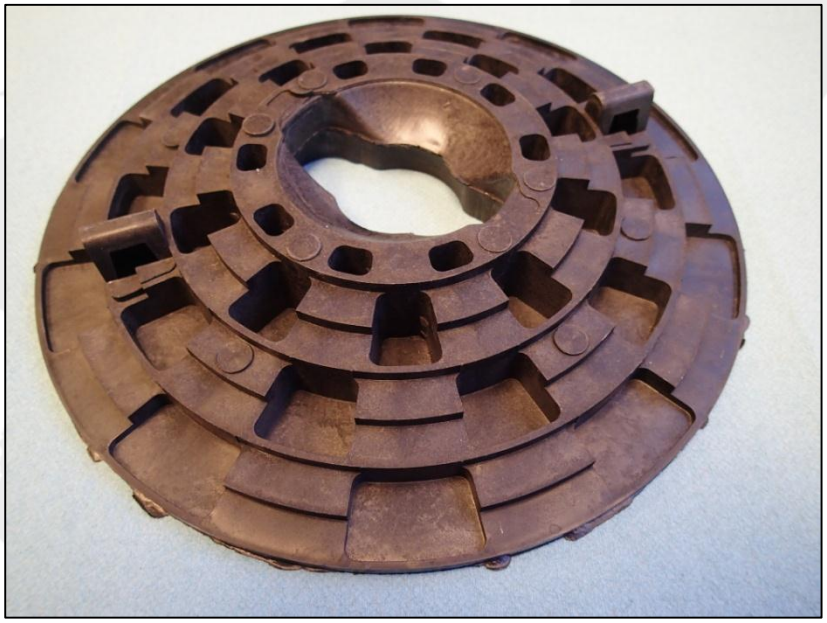
Non-Metallic Bolts and Plates

NON-METALLIC CUTTABLE PRODUCTS

- Products made from composite materials to resist corrosion in harsh mine environments.
- Provide rib support in longwall gate roads.
- Minimum load capacity of system (Bolt and Plate or Pan) 5 tons.

NON-METALLIC CUTTABLE PRODUCTS
Sinkable Plate

- Made of Glass Reinforced Nylon (GRN) for high density to sink when going through cleaning plant.
- Plate center allows bolt to be installed at an angle.
- Hangers molded into plate design.



NON-METALLIC CUTTABLE PRODUCTS
18” Fiberglass Pan

- Center section designed so that additional plates are not required.
- 18” Square pan provides more surface support.
- Constructed of fiberglass with a high density to sink when going through cleaning plant.

NON-METALLIC CUTTABLE PRODUCTS
Fiberglass Bolt

- GRN coating injected onto top of bolt to aid in mixing resin.
- The nut uses a standard 36mm hex wrench.
- Available in 3’ & 4’ lengths.

MINING

TUNNELING

CIVIL

JM USA®

JENNMAR

LEADING THE WAY IN GROUND CONTROL TECHNOLOGY

JENNMAR™ & KMS WOULD LIKE TO THANK YOU FOR OPPORTUNITY TO BE HERE TODAY.

J-Lok USA

JM USA JENNCHEM

KMS KEYSTONE MINING SERVICES

JM USA JENNMAR SPECIALTY PRODUCTS

JM USA STEEL

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