# ThorPlas-Blue for Industrial Applications

Thordon Bearings Inc.

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# ThorPlas-Blue Bearings

- A crystalline, premium grade, lifetime lubricated, engineered thermoplastic
  - Operates without grease
  - Excellent friction/wear properties
  - High Stiffness/Low Deflection
  - Easy to machine and install
  - Good chemical resistance

# ThorPlas-Blue Operating Temperatures

- Continuous in water: ~80ºC (~ 175ºF)
- In Dry Environments: ~110ºC (~230ºF)

# ThorPlas-Blue Material Properties

- Low friction – COF **dry 0.1, wet 0.1-0.17**
- Max. design pressure of 45 MPa (6500 psi) - in line with capabilities of bronze.
- Lifetime lubricated - **no oil or grease**
- Low thermal expansion & water absorption
- Excellent wear performance, especially in non-abrasive environments

# Key Benefits

- Extend equipment operating life
- Reduce maintenance costs
- Minimize environmental impact (no grease)
- Increase M.T.B.F. (Mean Time Between Failure)
- Improve reliability
- Reduce noise levels

# ThorPlas-Blue vs. Metal Bearings

| Advantages | Limitations |
|---|---|
| Less energy waste in manufacturing | Lower strength/stiffness, limiting the load carrying capacity |
| Lower friction | Lower operating temperatures |
| Lower density thus less weight | Lower dimensional stability |
| Lower wear | |
| No corrosion concerns | |
| Self-lubricating –NO GREASE required | |

# ThorPlas-Blue for Industrial Applications

- ThorPlas-Blue bearings perform well in these operating conditions:
  - Corrosive
  - High impact load
  - High humidity
  - Infrequent maintenance periods

# ThorPlas-Blue for Industrial Applications

- ThorPlas-Blue bearings have replaced greased bronze in:
  - Clean Power Generation applications
  - Pump Bearings
  - Agriculture (irrigation, farm equipment)
  - Gate, Lock and Dam Bearings
  - Industrial tractors and vehicle pivot points
  - Industrial hinge points (grapples)

# Transportation: Truck Stabilizer

**End User**:

Mining Facility, Peru

**Application:**

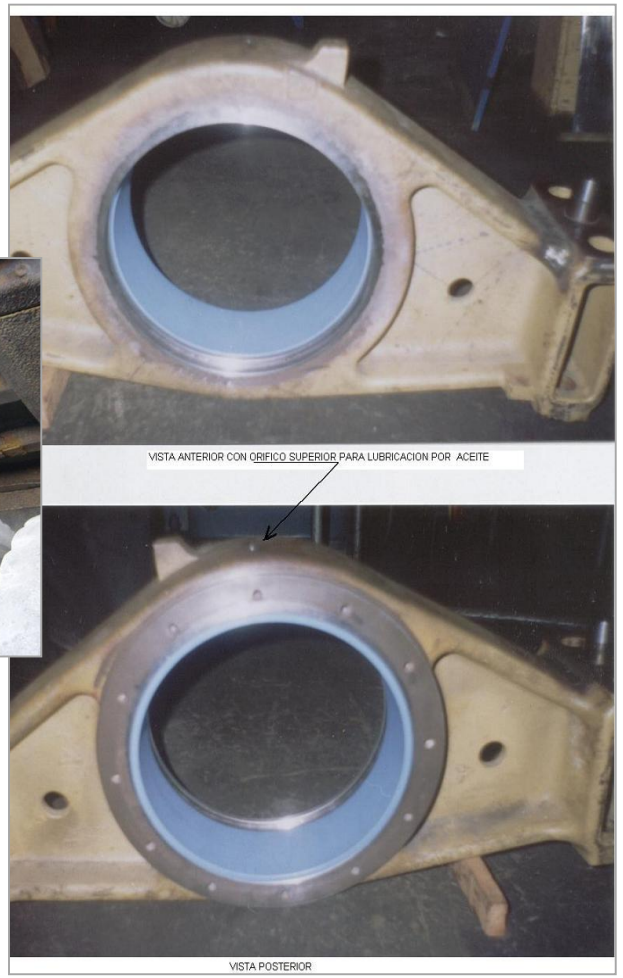
Steady Axle 100 Ton truck

**Installation Date**: March 2005

**Notes:**

Initial bearings were bronze, lasting 2500 hrs. Replaced it with Nylon that lasted 7000 hrs. **Currently, ThorPlas-Blue CONTINUES to operate without issues (>13,000 hours)**

- Large bearing sizes 348 mm (313.7”) x 327.5 mm (12.9”) x 101.6mm (4”)

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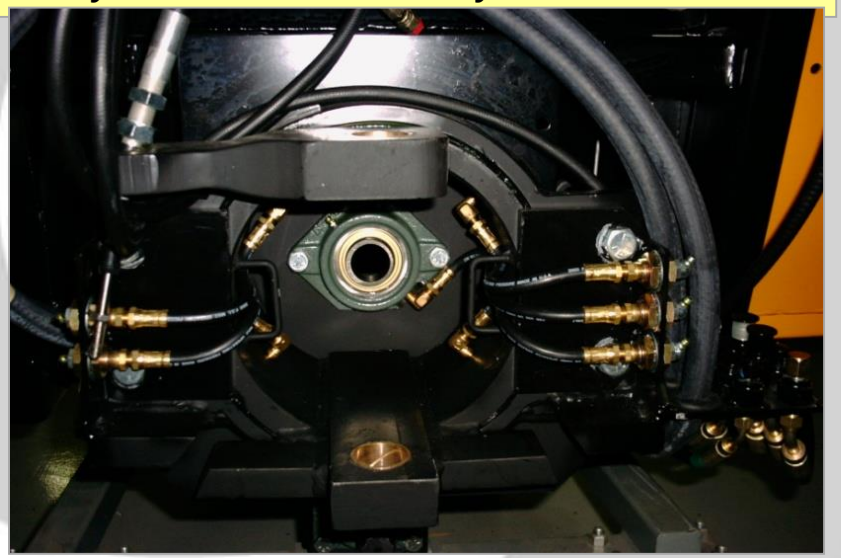
# Transportation: Stabilizer

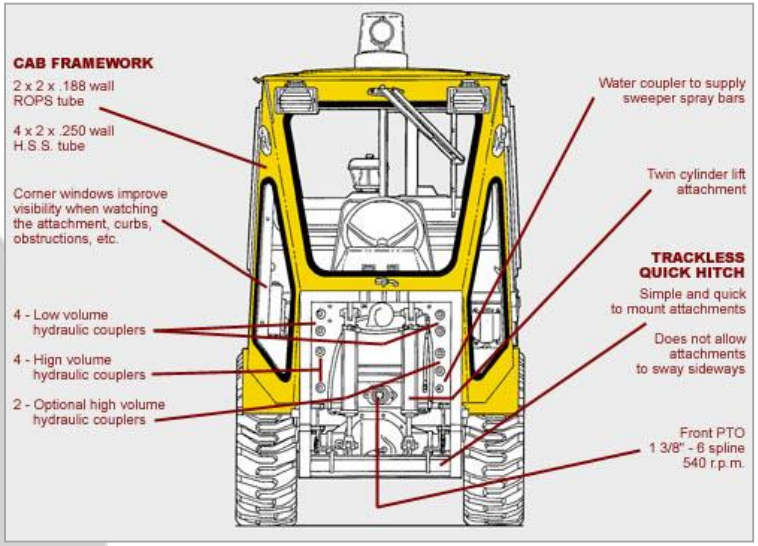
**End User:** City of Sudbury, Canada

**Application**: Trackless vehicle pivot bearing

**Installation Date**: November 2005

**Note:** ThorPlas-Blue replaced bronze (which were failing due to lack of grease). Life expectancy of 660 bronze is 1 year.



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# Transportation: Train Bridge

**Application:**

Train Bridge Bearings, Pennsylvania, U.S.A.

**Installed Sept. 2010 on:**

Railroad bridge that opens horizontally to allow vessel passage

**Notes:**

- 3 ThorPlas-Blue tubes supplied (280mm x 220mm x 305mm)
- Bearings machined by customer
- Lower bearing replacement
- Bearing is periodically submerged
- Planning to install upper bearings with ThorPlas-Blue in the future

# Transportation: Trolley Bus

**Application:**

Trolley Bus Hardy Clutch

**Installed on:**

Škoda Tr14M and Tr15m, Czech Republic

**Notes:**

- Hardy clutch involved replacing original materials as Pertinax (FR-2) and Tecamid for Thordon XL and ThorPlas-Blue
- Replacement of material has prolonged the service life by greater than 4 times

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# Transportation: Trolley Bus

**Application:**

Trolley Bus Break Key Bushings

**Installed on:**

Trolley buses with Škoda rear axels, Czech Republic

**Notes:**

- Involved changing of bronze bushings for Thordon's ThorPlas-Blue Material
- ThorPlas-Blue provides an environment where greasing is completely removed, allowing easy operation without any corrosion

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# Transportation: Conveyor Systems

**End User**

Honda Manufacturing, Alabama USA

**Application:**

Wash line roller conveyor bearings

**Installation Date:**

December 2004

**Note:** Metal needle bearings seizing due to grease contamination from process water. First order 600 ThorPlas-Blue bearings. Second ThorPlas-Blue order for 1230 bearings + 2500 washers

Example of type of conveyor system where ThorPlas-Blue has been installed successfully.

# Transportation: Tractor Pivot Points

**End User:**

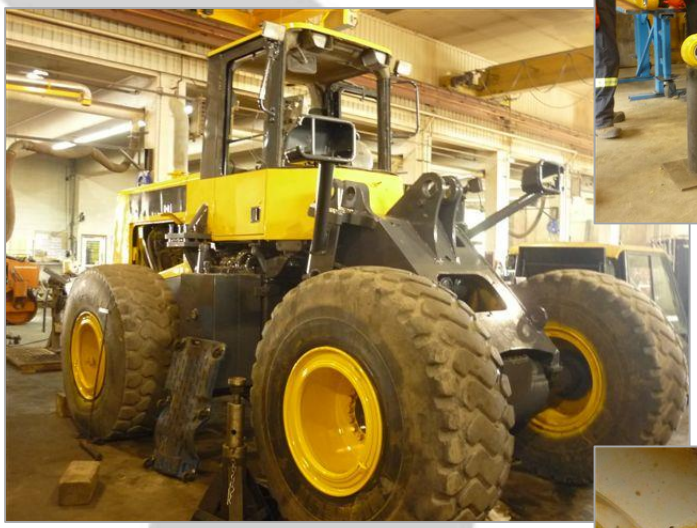
Couillard Construction, Québec, Canada

**Application**:

Tractor loader pivot point bearings. Tractor moves sand, snow, rocks.

**Installation Date**: Sept. 2011

**Notes:** Replaced hardened steel, as they wanted to eliminate greasing. Customer pleased with performance and has installed ThorPlas-Blue in other applications…excavator and trailers.



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# Transportation: Tractor Pivot Points

**End User:**

ASN Machinerie Inc., Québec, Canada

**Application**:

Komatsu Excavator pivot point bearings.

**Installation Date**:

March 21, 2012

**Note**:

Replaced Bronze-Aluminum bushings that were wearing very quickly.


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# Transportation: Wheel Idler Bushings

**Equipment:**

Bombardier Muskeg 133FR

**Application:** Wheel Idler Bushings and stabilizer bushings for track driven vehicle.

**Installation Date**: March 2010

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# Mining: Excavator Pivot Points

**OEM:** Gilles Cusson Inc.

**End User**: Bock Equipment, Québec, Canada

**Application**: Excavator pivot point bearings. Digs soil, rocks.

**Installation Date**: Nov. 2010

# Mining: Pivot Points

**End User:** Iamgold Corp., Westwood Project, Québec, Canada

**Application:** Mining single boom jumbo drill articulation boom and pivot point bearings.

**Installation Date:** August 2008; last update was May 2010 and bearings still working fine

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# Forestry: Material Handling

**End User:** Timrick Slashers (Canada)

**Application**: Slasher Grapple Bearing –Forestry

**Installation Date**: March 2005

**Note:** Robotec Grapple (OEM) - Can pick up tree length at lengths up to 60'. Replaced bronze bearings but will continue to grease for corrosion purposes.


# Forestry: Kiln Drying

**Application:**

Sawmill carrying container- wheel bearings. Pulp & Paper industry (Chile)

**Installation Date:**

January 2006

**Notes:**

- Bronze bearings lasting only 2 months. ThorPlas-Blue bearings inspected after 5 months. Minimal wear found – *expected service life of 10 months based on wear*.
- Hot temperatures & humidity in excess of 176°F (80°C) for short periods.
- Pressure >13.7 MPa (2000 psi).
- Anti-rotation pin placed on top of the bearing caused cracks yet bearings continued to operate without any issue.

# Material Handling: Scrap Metal Grapple

**Application:**

Grapple finger, collect and handle scrap metal

**Installation Date**:

December 2003

**Notes:**

- High shock and impact load.
- Pressure range 4000 to 5000 psi (27.5 to 34.4 MPa).
- Previous bearing was GREASED NYLON from OEM supplier requiring changes every 2-3 weeks.
- ThorPlas-Blue bearings OUTLIVED the grapple!
- Lower Cycle Costs –savings on cost of grease, labour to grease and replace previous bearings.

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# Material Handling: Scrap Metal Grapple

**End User**:

Morbro Marine, USA

**Application:**

Grapple Bearing

**Installation Date**:

October 2003

**Notes:**

ThorPlas-Blue replaced bronze that failed due to lack of grease lubrication. Housings were not “ideal” so a good test to bearing performance.

# Material Handling: Shipyard Crane

**End User:**

Kama River Transportation (Russia)

Cranes build by KE Kranbau Eberswalde, Germany

**Application**:

Crane bearings

**Installation Date**: December 2005

**Note:**

Original bearings were phenolic material. Replaced with bronze, service life does not exceed 2 years due to lack of lubrication.

Pressures around 21 MPa (3000 psi ).

Housings were not “ideal” making this a good test for bearing performance. 8 crane wheels converted to ThorPlas-Blue.

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# Food Handling:
# Corn Wet Milling

**End User**

Not disclosed,

North Carolina, U.S.A.

**Application:**

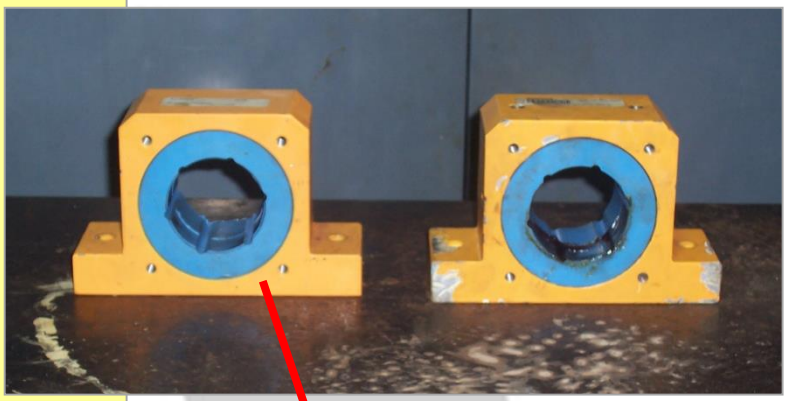
Grinder roller bearing support

**Installation Date:**

October 2005

**Note:**

- ThorPlas-Blue replaced greased SKF roller element bearings.
- Eliminated grease contamination
- Used ThorPlas-Blue due to acidic condition (sulfuric acid present during process)



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# Food Handling: Malting Process

**End User**

Canada Malting, Calgary

**Application:**

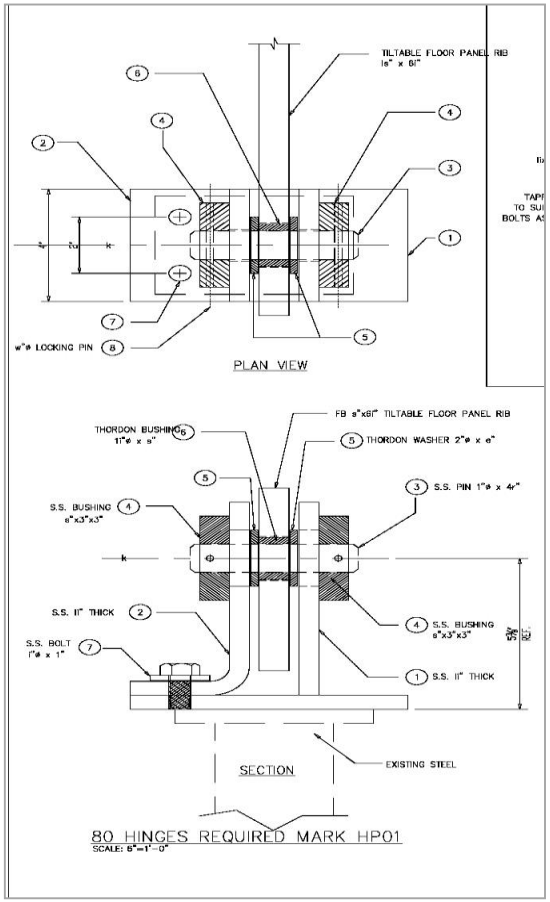
Steep Tank Hinge bearings

**Installation Date:**

ThorPlas-Blue installed in May 2006

**Note:**

- Customer has used phenolics and UHMWPE without success.
- Process product includes salt water for 95% of the time but once a month a cleaning solution is used containing:
  - Sodium Hypochlorite (25-55 ppm)
  - Calcium Hypochlorite (1%)
- Temperature can reach 176°F (80°C)

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# Food Processing: Pork Processing Hangers

**Application:**

Pig Hanger Wheels- Roller Bearings

**Installation Date:**

• June 2010

**Notes:**

- Replaced roller bearings with ThorPlas-Blue bearing solution
- One ThorPlas-Blue bearing replaced 2 Roller Bearings
- Roller bearings had to be replaced monthly, while the ThorPlas-Blue bearings had a service life of over 1 year
- Significantly reduced maintenance costs

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# Textiles: Rollers

**End User**

Textile Mill (Virginia, USA)

**Application:**

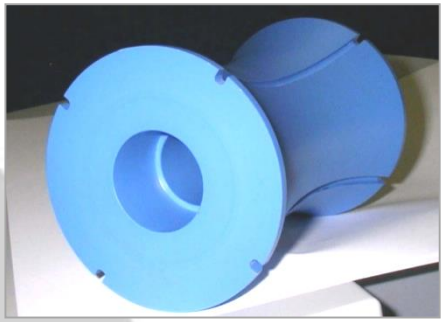
Not disclosed BUT suspect equipment similar to a ***Ring Spinning Frame see picture***

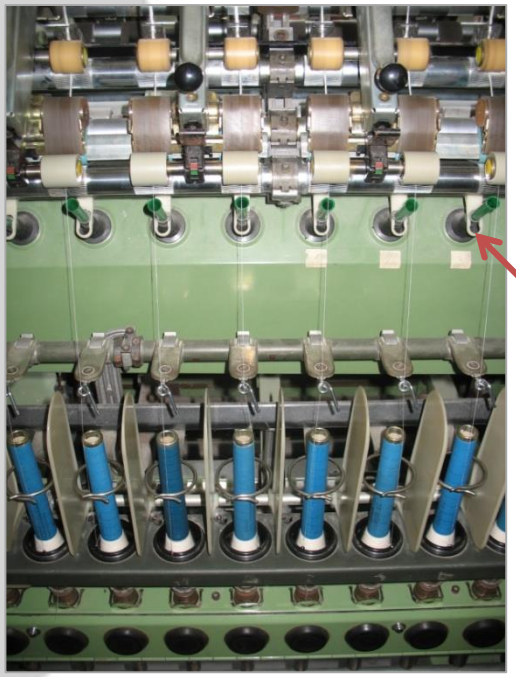
**Installation Date:**

January 2007

**Note:**

- This was a trial test
- ThorPlas-Blue replaced Aluminum and Ceramic rollers
- Fibre is drawn over the rollers, groves on OD help to cut fibre (if needed).
- Light loads, medium speeds





Example of "Ring Spinning Frame" used to spin fibres to make yarn

# ThorPlas-Blue Benefits

- Easily back fit into virtually all applications where bronze is currently installed
- Environmentally friendly
  - No greasing required (cost of lube + labor)
  - Lifetime Lubricated
- Safety during machining
- Easy Installation