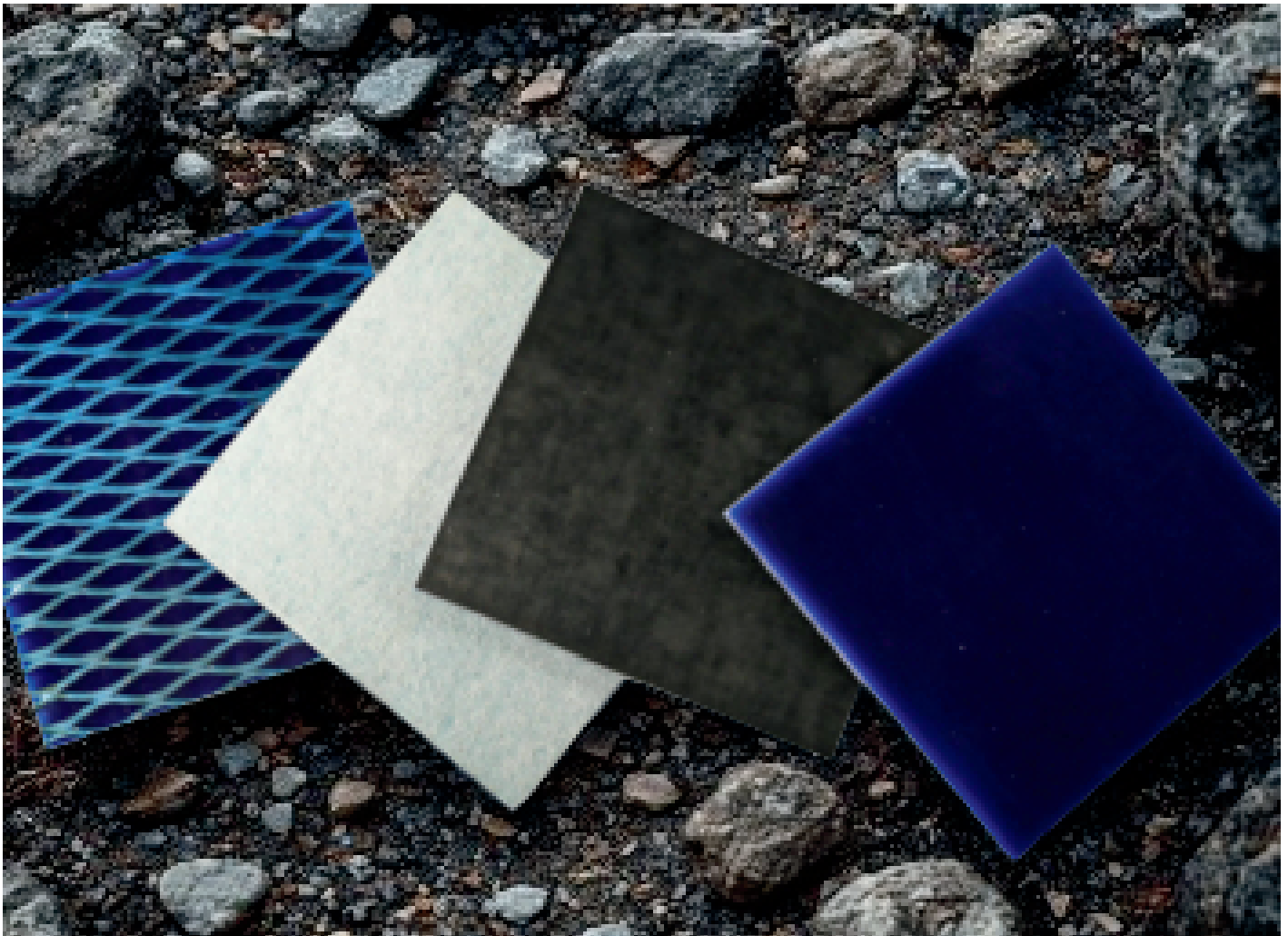


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NIAGARA

POLYURETHANE LINERS PORTFOLIO



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FOOD PROCESSING INDUSTRY

POLYURETHANE LINERS IMPROVE WEAR LIFE
AND EFFICIENCY IN GRAIN HANDLING



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GRAIN HANDLING

Case Study: Polyurethane Liners Improve Wear Life and Efficiency in Grain Handling Transfer Chutes

TECHNICAL DETAILS

Industry:

Port Operations / Bulk
Material Handling

Application:

Transfer Chute – TC-
32/33
Porto de Santos, São
Paulo, Brazil

Material Handled:

Corn, soybean meal, and
sugar

Challenge

A major integrated logistics provider operating at the Port of Santos was facing premature liner wear and material buildup in their transfer chutes, specifically chute TC-32/33. The original liners used were 15 mm thick UHMW (Ultra High Molecular Weight Polyethylene), which had a short wear life of only 6 months.

Operators noted two primary issues:

- Frequent liner replacements resulting in increased maintenance downtime.
- Material sticking to worn UHMW surfaces, reducing flow efficiency.

Solution

To address these issues, the company trialed Rhino Hyde® polyurethane liners with FDA certification (safe for food contact) and the same 15 mm thickness as UHMW. The polyurethane product was selected based on its known abrasion resistance, low material buildup, and durability.

- Installation period: September 2022 - January 2023
- Material Processed During Evaluation Period: ~1.3 million tons over 190 days



WEAR PERFORMANCE TRIALS REALIZED

Results

After 6 months of operation (the same period in which UHMW liners had previously failed), the polyurethane liners remained intact and operational, showing minimal wear.

Comparative analysis concluded:

- UHMW showed significant degradation and surface grooving, increasing material adherence.
- Polyurethane surfaces, in contrast, became smoother over time, reducing material buildup and promoting a more consistent flow.

The improved wear performance and efficiency prompted the customer to move forward with a broader implementation.

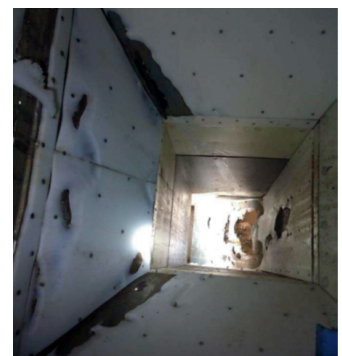
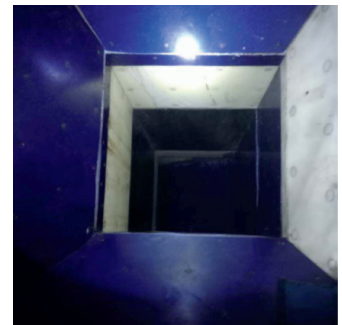
Customer Action

After verifying the benefits, the company purchased 88 polyurethane liners (3050 x 1220 x 15 mm) at the end of 2023.

- 80% of these liners were installed during the January 2024 maintenance shutdown.
- They were prioritized for high-wear zones, while UHMW was retained in less critical areas.

Advantages of PU over UHMW

- Easy to cut and install
- Less material adhesion
- greater resistance to impact and abrasion
- less noise
- best cost benefit considering the useful life
- Less equipment downtime



GRAIN HANDLING

Case Study: Polyurethane Liners Enhance Safety and Durability in Ship Loader Applications

TECHNICAL DETAILS

Industry:

Port Operations / Bulk
Material Handling

Application:

Ship Loader - CN01
Porto de Santos, São
Paulo, Brazil

Material Handled:

Corn, soybean meal

Challenge

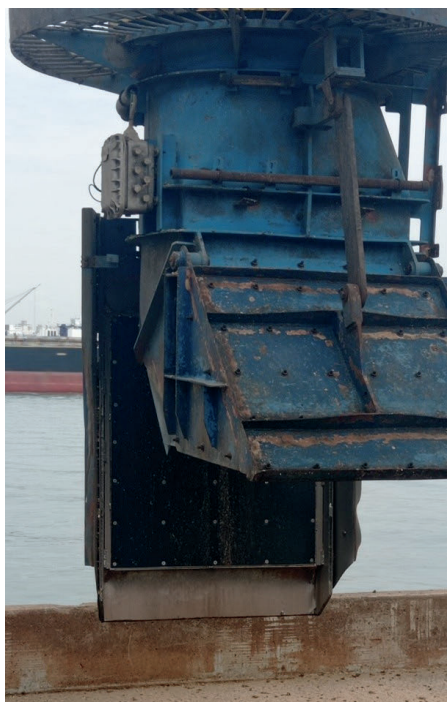
A grain terminal at the Port of Santos, faced critical operational issues with the liner materials used in their ship loading equipment:

- Use of Hardox 450 steel liners (3/8" thick) resulted in a short service life of just 1 year.
- The steel plates were heavy and difficult to install, presenting safety hazards for maintenance crews.

Solution

To address these challenges, the company installed Rhino Hyde® polyurethane liners (20 mm, plain). This FDA-certified material is designed for food-safe applications and known for its high durability and ease of handling.

- Material Processed During Evaluation Period: ~4.5 million tons over 583 days



WEAR PERFORMANCE TRIALS REALIZED

Results

Following over a year and a half of continuous use:

- Rhino Hyde liners showed excellent performance with minimal wear, confirming an expected service life of 3 years.
- Performance exceeded that of Hardox, which typically failed after 1 year.
- The lighter weight of polyurethane significantly improved installation safety and speed.

Customer Action

Due to the improved wear life, reduced downtime, and enhanced safety of polyurethane liners, the customer plans to continue implementation across similar high-wear areas.

Conclusion

Rhino Hyde® polyurethane liners offer substantial advantages over traditional steel solutions in grain handling operations. With an expected lifetime three times longer than Hardox and a dramatic improvement in safety and ease of installation, polyurethane has proven to be a smarter and safer solution for ship loader applications.

Advantages of PU over Hardox

- Easy to cut and install
- Lightweight
- Less material adhesion
- Greater resistance to impact and abrasion
- Less noise
- Lower costs
- Safety
- Less equipment downtime

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MINERAL PROCESSING INDUSTRY

POLYURETHANE LINERS IMPROVE WEAR LIFE
AND EFFICIENCY IN IRON ORE PROCESSING



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IRON ORE CRUSHING

Case Study: Rhino Hyde Liners Improve Durability and Reduce Downtime in Iron Ore Crushing

TECHNICAL DETAILS

Industry:

Mining

Application:

Primary Crusher Feed
Hopper

Material Handled:

Iron Ore - top size: 3
1/2" (90mm)

Challenge

A client operating in the iron ore sector, was encountering critical wear and operational issues in their primary crusher feed hopper:

- The previously used UHMW liners (22 mm thick) had a short service life of only 30 days.
- Major issues included rapid liner wear, iron ore sticking to surfaces, and high noise levels.
- These problems led to frequent maintenance shutdowns, safety risks, and reduced operational efficiency.

Solution

To address these concerns, the client installed Rhino Hyde® polyurethane liners (22 mm thick with fabric backing).

- Verification Period: 60 days



WEAR PERFORMANCE TRIALS REALIZED

Results

After two months of operation:

- Rhino Hyde doubled the lifespan compared to UHMW, lasting at least 60 days.
- Significantly reduced material accumulation due to lower surface friction.
- Decreased maintenance shutdowns and associated downtime.
- Lower noise levels during crusher operation.

Customer Action

Following the successful trial, the client approved Rhino Hyde for broader use. It is now utilized in:

- All under and over chutes of the sieves
- Transfer chutes throughout the facility

Conclusion

Rhino Hyde® polyurethane liners provided a substantial upgrade over UHMW in iron ore handling. With double the wear life, reduced material buildup, and lower maintenance frequency, Rhino Hyde helped the client enhance operational efficiency and safety in one of their most demanding applications.

Advantages of PU over UHMW

- Easy to cut and install
- Less material adhesion
- greater resistance to impact and abrasion
- less noise
- best cost benefit considering the useful life
- Less equipment downtime



IRON ORE CRUSHING

Case Study: Rhino Hyde Slyde Black Increases Wear Life and Reduces Material Accumulation in Niobium Ore Processing

TECHNICAL DETAILS

Industry:

Mining

Application:

Vibrating Feeder in
Crushing Plant
Goiás, Brazil

Material Handled:

Iron Ore - top size: 3
1/2" (90mm)

Challenge

A client in niobium mining, was experiencing rapid wear and operational inefficiencies in the vibrating feeder of its crushing plant:

- The existing PEAD (High Density Polyethylene) liners were failing within 54 days.
- The surface promoted material accumulation, leading to frequent shutdowns for cleaning.

Solution

To overcome these issues, the company implemented Rhino Hyde® Slyde Black (with nanographite) polyurethane liners in varying thicknesses (25 mm, 19 mm, and 12 mm) with fabric backing to ensure secure installation and enhanced durability.

- Verification Period: 144 days



WEAR PERFORMANCE TRIALS REALIZED

Results

Post-installation observations showed:

- Rhino Hyde Slyde Black had more than twice the wear life compared to PEAD.
- Significant reduction in material accumulation, minimizing the need for manual intervention.
- Improved process continuity, resulting in less equipment downtime.

Conclusion

The application of Rhino Hyde® Slyde Black polyurethane liners at client's crushing plant resulted in a durable, low-maintenance solution for handling niobium ore. With over double the lifespan and reduced shutdowns for material buildup, the upgrade marks a significant improvement in efficiency and operational safety.

Advantages of PU over PEAD

- Easy to cut and install
- Less material adhesion
- greater resistance to impact and abrasion
- less noise
- best cost benefit
- Less equipment downtime



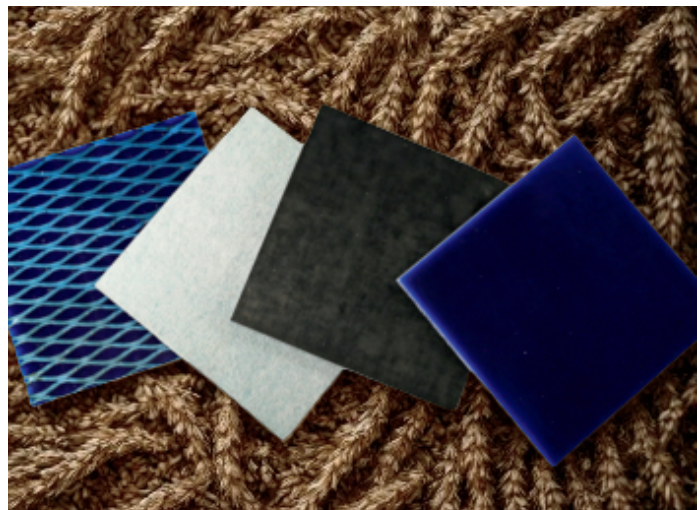
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Key Benefits of Polyurethane

- ✓ Easy to install
- ✓ Easy to cut
- ✓ Less noise during material flow
- ✓ Less material adhesion
- ✓ Lower equipment downtime
- ✓ Higher impact and abrasion resistance
- ✓ Superior cost-benefit ratio over lifetime
- ✓ FDA certified for food contact



Rhino Hyde® polyurethane liners offer a vastly improved service life, reduced maintenance, and greater reliability in abrasive and high-throughput applications. The switch to polyurethane has delivered both performance and economic advantages in each case study example and is an excellent choice in wear prevention while optimizing production.

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