



Make quality everything
Apex[®]
Quality Polymer Solutions

LinaShield

A thermoplastic polyurethane sheeting
for high abrasion applications

Apex[®] Polymer Solutions (Pty) Ltd*

☎ 087 562 9800

🌐 www.apexpolymers.co.za

✉ info@apexpolymers.co.za

**Previously trading as Perspex SA*

Extend the life of heavy-duty equipment



- Developed for **optimal wear performance & longevity** of heavy-duty equipment
- Outstanding resistance to abrasion, strokes, sharp objects, oils & greases
- Weather resistant and does not degrade from UV radiation/light
- Optimal aggregate size up to 35mm³, otherwise use in conjunction with cast PU or rubber with low shore hardness
- Up to 20 times* longer lifespan

** Dependent on application*



Typical Industries:

- Mining
- Mineral processing plants
- Bulk material handling equipment
- Thermal power stations
- Transportation
- Agriculture (grain storage & handling)
- Food & Feed Processing
- Construction
- Aggregates
- Earth Moving Equipment



Typical Applications:

- Wear linings
- Cyclones
- Screens
- Belts
- Conveyors
- Dump truck linings
- Wagons
- Silos
- Chutes
- Feeding channels
- Magnetic separators
- Cones | Hoppers
- Crushers
- Sorters
- Skips
- Bins
- Slurry Channels
- And MANY more



Benefits of LinaShield



- Highest abrasion resistance compared to traditional linings
- Low co-efficient of friction (non-stick liners)
- Elasticity in broad temperature range
- High tear resistance
- No skin irritation
- No plasticizers, so enhanced longevity compared to rubber
- Perfect for welding & bonding
- Excellent low-temp impact strength
- Lasts longer than rubber linings, reducing downtime and contributes to cost savings
- Reduces vibration
- UV resistant



Case Studies - In partnership with Pro-Op Industries

Welcome to Pro-Op Industries

Established in 2011 we have been serving the minerals processing sectors for 10 Years. The company was founded on the principles of **adding value** through process optimisation and have continued to build on this foundation.

Today Pro-Op Industries supply top quality brands in the field of bulk material handling, wear protection and quality control. Our products and services aim **to reduce costs** and **increase production**, but you can be assured that we will **positively influence** your bottom line.



Case Studies - In partnership with Pro-Op Industries

Case Study – 1

Sishen, NC
Iron Ore

LinaShield

Thermoplastic Polyurethane

PRODUCT:	LinaShield Thermoplastic Polyurethane Wear Liners
LOCATION:	Sishen Iron Ore, Northern Cape, RSA
PRODUCT DESCRIPTION:	10mm LinaShield with 17mm centre cast Polyurethane and 5mm fibreglass backing
SHORE A HARDNESS:	85°
APPLICATION:	Wear plates on a washing and screening vibrating panel
MAXIMUM PARTICLE SIZE:	80mm rocks
INSTALLATION DATE:	January 2021
TEST RESULT:	Double the life of current cast polyurethane liners



Case Studies - In partnership with Pro-Op Industries

Case Study - 1

Sishen, NC

LinaShield

Thermoplastic Polyurethane

PROBLEM DESCRIPTION:

Sishen represents one of the largest iron ore reserves in South Africa and in the world having estimated reserves of 2.43 billion tonnes of ore grading 58.6% iron metal.

Sishen has highly abrasive rocks sliding on a vibrating screen and currently use traditional cast polyurethane wear plates bolted in place.

SOLUTION:

10mm Linashield was used as the working face material. Traditional polyurethane was then cast on to the Linashield creating a monolithic bond between the two materials. The Linashield with cast polyurethane was then bonded onto a 5mm fibreglass backing plate.



Case Studies - In partnership with Pro-Op Industries

Case Study - 1

Sishen, NC

LinaShield

Thermoplastic Polyurethane

TEST RESULT:

LinaShield was installed on the vibrating screen where highly abrasive rocks slide. The Linashield reinforced wear plates lasted twice as long as the traditional cast polyurethane wear plates.

IMAGES:



Case Studies - In partnership with Pro-Op Industries

Case Study - 2

EPKO, North West

LinaShield

Thermoplastic Polyurethane

PRODUCT:	LinaShield Thermoplastic Polyurethane Lining
LOCATION:	EPKO Sunflower oil, North West, RSA
PRODUCT DESCRIPTION:	3mm Linashield
SHORE A HARDNESS:	85°
APPLICATION:	3mm Linashield glued to mild steel for wear protection against sunflower husks
MAXIMUM PARTICLE SIZE:	5mm
INSTALLATION DATE:	February 2021
TEST RESULT:	After 4 months there is no measurable wear and there is no more material build-up in the equipment which used to be a problem for the plant. The expected life of the lining is 10 years



Case Studies - In partnership with Pro-Op Industries

Case Study - 2

EPKO, Sunflower Oil Plant, North West

LinaShield

Thermoplastic Polyurethane

PROBLEM DESCRIPTION:

EPKO is a Sunflower oil plant. This section of the plant separates the sunflower husks from the seeds with cyclones and a series of ducting and y-pieces in the ducting lines. Areas of high wear such as the bends, y-pieces and the cyclone outlets wore through in 12 to 18 months and had to be replaced to avoid air ingress which reduces the separation efficiency of the plant.

The organic material also built up in certain zones which in turn created air flow problems.

SOLUTION:

Linashield was chosen for both its abrasion resistance and non-stick properties. Based on the performance of the 3mm mild steel, it was decided to only apply a 3mm lining. With this type of abrasion Linashield will last at least 10 times longer than mildsteel and therefore it was cost effective to only use 3mm.



Case Studies - In partnership with Pro-Op Industries

Case Study - 2

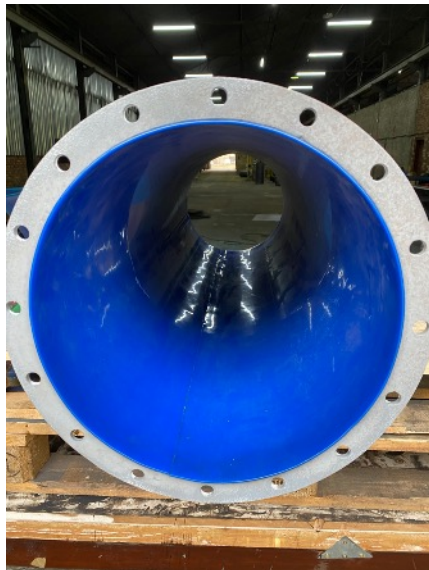
EPKO – North West

LinaShield

Thermoplastic Polyurethane

TEST RESULT:

The first line has been in operation since February 2021. The equipment was inspected after 4 months and revealed no wear to date and there was also no material build up in areas where they normally experienced these problems. The initial result confirmed that the 10-year life expectancy is indeed realistic.



Case Studies - In partnership with Pro-Op Industries

Case Study - 3

Iron Ore Mine, South Africa

LinaShield

Thermoplastic Polyurethane

PRODUCT:	LinaShield Thermoplastic Polyurethane
LOCATION:	Iron Ore Mine, South Africa
PRODUCT DESCRIPTION:	10mm LinaShield Flange and 5mm LinaShield Pipe Lining glued to NPS 7" Steel Pipes
SHORE A HARDNESS:	85°
APPLICATION:	Slurry
MAXIMUM PARTICLE SIZE:	-12mm
MANUFACTURE DATE:	February 2020
TEST RESULT:	Successful



Case Studies - In partnership with Pro-Op Industries

Case Study - 3

Iron Ore Mine, SA

LinaShield

Thermoplastic Polyurethane

PROBLEM DESCRIPTION:

The customer has been using natural 12mm rubber from a reputable supplier for a number of years in their JIG separation plant. The rubber solution has a life of approximately 6 to 8 weeks. This resulted in premature shutdown of the system to effect temporary repairs too frequently.

SOLUTION:

A 5mm LinaShield lining was glued in the inside of distance piece pipes together with 10mm LinaShield Flanges. The glue used was Topstick PL.

The distance piece pipes were manufactured by Pro-Op Industries.



Case Studies - In partnership with Pro-Op Industries

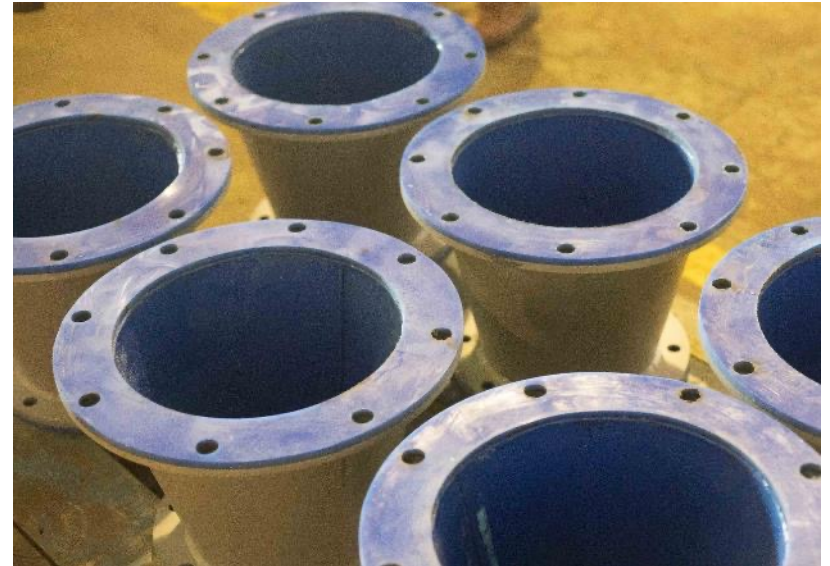
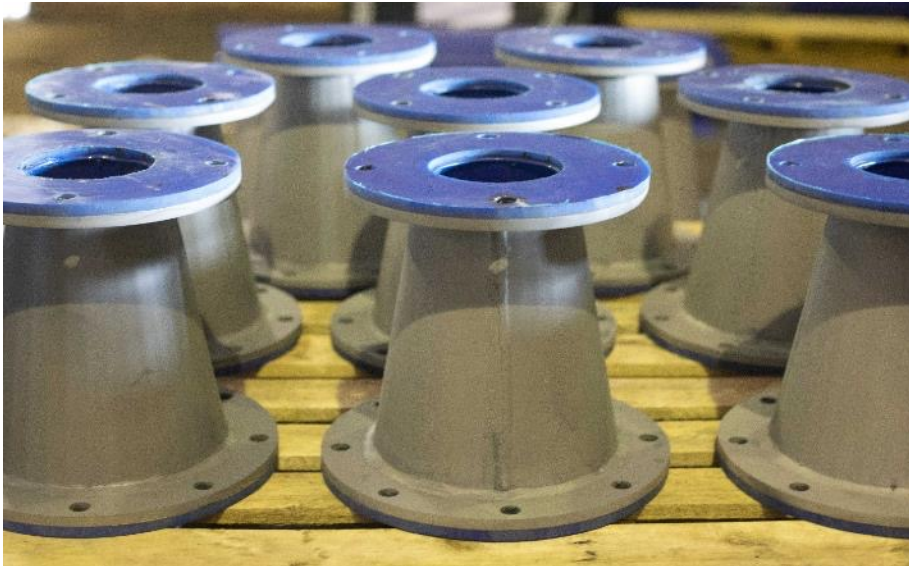
Case Study - 3

Iron Ore Mine, SA

LinaShield

Thermoplastic Polyurethane

IMAGES & DRAWINGS:



Case Studies - In partnership with Pro-Op Industries

Case Study - 4

Eskom, Mpumalanga

LinaShield

Thermoplastic Polyurethane

PRODUCT:	LinaShield Thermoplastic Polyurethane
LOCATION:	ESKOM Kusile, Mpumalanga, RSA
PRODUCT DESCRIPTION:	5mm Linashield
SHORE A HARDNESS:	85°
APPLICATION:	5mm coal tipper car covers
MAXIMUM PARTICLE SIZE:	Mechanical abrasion from equipment
INSTALLATION DATE:	December 2019
TEST RESULT:	ESKOM used rubber for the same application in the past which would normally lasts 12 months. The Linashield is still in operation after 19 months of continuous operation.



Case Studies - In partnership with Pro-Op Industries

Case Study - 4

Eskom, Mpumalanga

LinaShield

Thermoplastic Polyurethane

PROBLEM DESCRIPTION:

ESKOM Kusile used rubber sheets as dust covers on top of the coal silos. The tipper car is designed to open and closed these covers as it moves from one silo to the next. One tipper car uses three covers, of which two is 480mm wide and the third is 680mm wide. All three covers are 50m long.

ESKOM had to replace these covers every 12 months, which is a time consuming and expensive task.

SOLUTION:

5mm Linashield was chosen for this application for its flexibility, abrasion resistance as well as superior tear resistance.



Case Studies - In partnership with Pro-Op Industries

Case Study - 4

Eskom, Mpumalanga

LinaShield

Thermoplastic Polyurethane

TEST RESULT:

One tipper car line was used for trial purposes. The covers were installed in Dec 2019 and is still in operation after 19 months. It expected that the Linashield will last 3 to 4 times longer than the original rubber application.



Case Studies - In partnership with Pro-Op Industries

Case Study - 5

Dump Truck, Ireland

LinaShield

Thermoplastic Polyurethane

PRODUCT:	LinaShield Thermoplastic Polyurethane
LOCATION:	Ireland
PRODUCT DESCRIPTION:	5mm Linashield
APPLICATION:	10mm Linashield for abrasion resistance, 40mm rubber for absorption of impact and 15mm metal
INSTALLATION DATE:	2011
TEST RESULT:	Still in operation



10mm LinaShield
40mm Rubber
15mm Metal



Case Studies - In partnership with Pro-Op Industries

Case Study - 5

Dump Truck, Ireland

LinaShield

Thermoplastic Polyurethane

PROBLEM DESCRIPTION:

Lining needed to prolong the bed of the tipper, mainly due to high abrasive loads.

SOLUTION:

10mm Linashield was chosen for this application for its flexibility, abrasion resistance as well as superior tear resistance.



Case Studies - In partnership with Pro-Op Industries

Case Study - 5

Dump Truck, Ireland

LinaShield

Thermoplastic Polyurethane

TEST RESULT:

Tipper truck liner was installed in 2011. After 15 months the liner was still in tact and to date, is still in operation.



Summary of Additional Case Studies Performed

Copper Casting Plant - Slag Chute

Average particle size < 40mm
Hardened metal was wearing out in 15 days
After 30 days Linashield was still in service

Coal Mine - Cone Chute

Rubber 15mm thick was wearing out in 6 months
Linashield 10mm had no signs of wear after 6 months.

Coal mine - Curtain over screens

Linatex red Rubber 20mm worn out after 3 months
Linashield 5mm thick no signs of wear after 8 weeks

Coal Mine - Main chute towards power plant

Mn steel worn out after 2 months
Linashield 10mm had less than 1mm of wear after 1 year
1 million tons of coal through process

Coal Mine - Slurry Channel

Cast Polyurethane was worn out after 4 weeks
Linashield 10mm in service for 20 weeks.

Diamond Mine - Chute

Rubber 20mm thick was worn out after 2 weeks
Linashield 4mm thick was worn out after 2 months

Conveyor belts

Armoured conveyor belts are used to replace rubber belts
Also used to splice belts and prolong lifespan

Flip flop screens

Cast PU screens wear and tear after few months
Linashield showing extended lifespan
Decreases downtime.

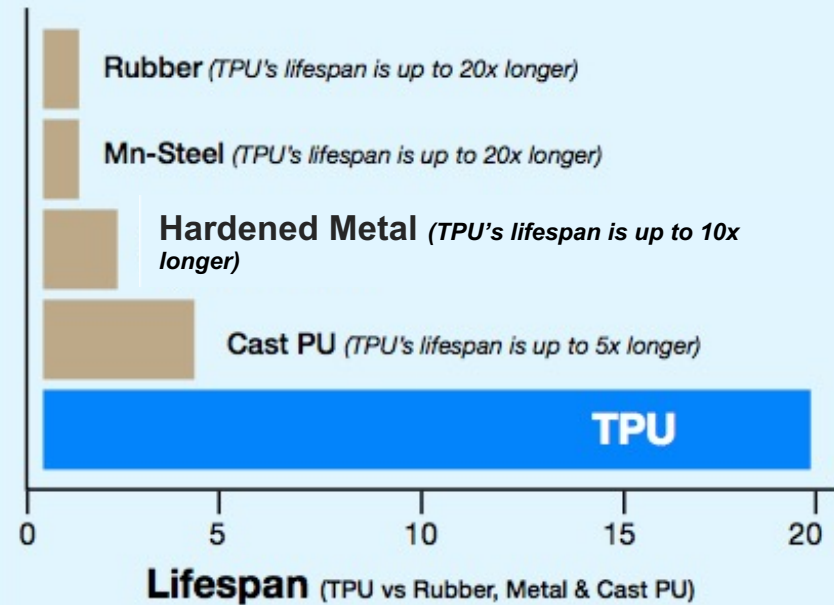


Performance of LineShield



Performance:

The performance of **Perspex® Linashield** in most cases** has shown that TPU has a far greater lifespan than conventional options:



** We cannot guarantee the exact longevity of TPU linings in different applications. Consult us for specified performance in various applications.



Working with LinaShield



LineShield - Welding Tutorial

LINASHIELD
WELDING TUTORIAL



Working with LinaShield

LinaShield thermoplastic polyurethane sheets are **easily machinable** and can be **manipulated using metal or woodworking tools** and equipment. Includes sawing, drilling, turning, milling and planning, punching, thread cutting and grinding.

LinaShield can either be **glued** to any type of surface or can be **mechanically attached to surfaces with bolts**.

Linashield is available in:

- thicknesses of 2/3/5mm
 - Ordered in lengths, on rolls of 1.5m wide
 - Comes standard in red
- thicknesses of 8mm and 10mm
 - Ordered in sheets of 3m x 1,5m OR in rolls (on request)
 - 8-10mm comes standard in blue

Environmental advantages:

- Noise and dust reduction.
- Reduction of vibration and noise in cabin.



Endless Possibilities

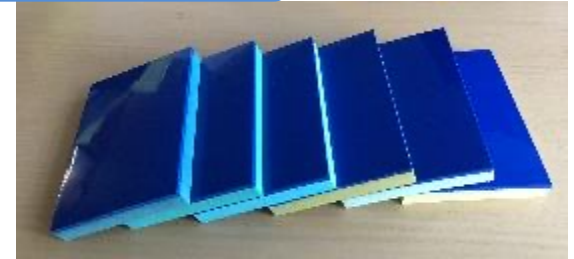
Cages for search & rescue dogs



Refurbished delivery vehicles



Sandwich pads for noise reduction



Vac Forming



Impact Bars



Gutters



LinaShield

PERSPEX SOUTH AFRICA
LinaShield

Safeguard Your Essential Equipment & Machinery

PERSPEX SOUTH AFRICA
LinaShield

For high abrasion mining applications including wear linings, screens, belts and conveyors.

Lasts up to **20x** longer than conventional materials

Material	Lifespan (Relative)
Rubber	1
Mn-Steel	2
Hardened Metal	3
Cast PU	4
LinaShield	20

PERSPEX SOUTH AFRICA
LinaShield

Advanced Protection for Harsh Environments

- Reduces vibrations on shafts, rollers and chutes
- Improves productivity by reducing downtime

