

# PROK

Quality Conveyor Equipment

**PULLEY REFURBISHMENT SERVICES**



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# Capability Statement

**PROK pulleys are designed and engineered for extended service in heavy duty mining and industrial applications. This specifically includes designing these pulleys so they can be refurbished, generally allowing the most costly parts of the pulley being the shell and shaft to be salvaged and reused safely, representing a significant cost saving against purchase of a completely new pulley.**

While service parts such as bearings, seals and lagging will need to be replaced from time to time, this is no reason to accept a rebuilt pulley that does not meet the same build quality, specification and safety performance of the OEM pulley.

PROK engineers and technical sales staff have inspected many pulleys that have prematurely failed in service. A common thread is these pulleys have typically been refurbished by generalist engineering workshops, with little understanding or regard for the importance of the materials and quality of work required when working with a highly loaded piece of rotating equipment such as a conveyor pulley.

In response to the need for a professional OEM grade pulley refurbishment service that provides a finished product capable of meeting the same exacting standards of design and build quality as an OEM pulley, PROK has established Pulley Refurbishment Services in key locations.

PROK has the global capacity to manufacture over 5,000 pulleys per annum with assembled masses upwards of 30 metric tonnes.



# Benefits of PROK Pulley Refurbishment

## Cost effective and reduced downtime

PROK refurbished pulleys provide a significant cost saving against a complete new pulley.

In most cases the pulley shell and shaft can be refurbished, resulting in a greatly reduced lead time compared to building a completely new pulley.

## Pre-Inspection

Prior to refurbishing any pulley PROK will fully disassemble and inspect the pulley. This allows us to conduct a detailed inspection of all components to confirm their suitability for re-use, refurbishment or replacement. A detailed written inspection report is issued to the customer along with repair recommendations and pricing for the refurbishment works, as well as the new pulley price for comparison.

This process ensures that the information given is both accurate and reliable, allowing our customers to make an informed decision regarding the future of their valuable pulley assets.

## OEM Specification Parts and Quality of Assembly

PROK pulley refurbishment centres have access to all of the current manufacturing drawings and specifications for your PROK pulleys.

This ensures that all materials and parts meet or exceed the specified requirements for the original pulley. As one of the largest manufacturers of conveyor pulleys, PROK are able to re-manufacture all of the major components such as the shaft or shell in order to return your existing pulley to service in an efficient and safe manner.

Also as an OEM, PROK understands the importance of meeting manufacturing and assembly tolerances when re-building a pulley. Incorrect assembly can cause immediate issues such as the pulley simply not fitting up to structure or couplings, through to less obvious problems such as premature shell failure, bearing failure or locking element failure when either the incorrect specification parts are used or they have been incorrectly installed.



As well as reconditioning PROK pulleys our service centres can also refurbish pulleys manufactured by others. In these cases PROK will replicate the original construction and warrant the materials and workmanship in accordance with our standard warranty.

We can even upgrade your pulleys to PROK design standards if required, using your operating conditions to carry out a design verification to ensure that the pulley is fit for the intended purpose, and if not recommend modifications utilising as much of the existing pulley as possible. This is a service that only a pulley OEM can offer.



## Inspection and Non-Destructive Testing

PROK inspect all major parts for condition, including dimensional inspection of key features to ensure wear is not excessive. In addition shell welds and the shaft are inspected for cracks and other mechanical damage.

Where a heavily worn or damaged part is believed to be salvageable, PROK Engineers will provide advice on the suitability of re-using the part. For critical applications PROK recommend that non-destructive testing is carried out on selected components. This can include ultrasonic inspection of shell welds, end disc bores and the shaft to ensure that these items still meet the specifications for a new pulley.

## Pulley Lagging and Protective Coatings

As an OEM PROK has access to the full range of lagging products and can rebuild a pulley with lagging that is the same as originally specified or we can upgrade the lagging where requested.

PROK Pulley Refurbishment Service centres can supply hot vulcanised (steam cured) lagging as well as cold bonded rubber lagging, direct bonded ceramic lagging and cast polyurethane lagging.

This includes our PROK Hot Vulcanised Ceramic Lagging (HVCL). This revolutionary system combines all of the advantages and benefits of hot vulcanized lagging with rubber backed ceramic lagging. This product is ideally suited for high tension drive pulleys where high bond strength between the lagging and the pulley shell is required and in most applications when lagging wear is an issue.

## Replace all wear parts

PROK replace all worn and highly stressed parts on a refurbished pulley. This is not the case with many suppliers who take short cuts and often only replace failed parts, raising the risk that one of these second hand components may fail prematurely after being returned to service.

All PROK refurbished pulleys (unless requested otherwise) are fitted with new bearings and adaptor sleeves, housing seals, and locking elements.

## Re-design for OEM Replacement of Obsolete Pulleys

Some pulleys are now considered obsolete due to the design of the pulley being outdated or because parts are no longer available. In this case PROK, as an OEM, is able to design a new pulley for your application utilising existing components where possible.

This provides reassurance your replacement pulley is designed and manufactured in accordance with the same OEM standards as a new PROK pulley.



# PROK Pulley Lagging

## PROK offers the full range of Pulley Lagging options

We treat Pulley Lagging the same as every other aspect of Pulley Design and take the approach that the best solution comes from understanding the operating conditions. There is no one perfect solution for all situations, and in turn no single lagging type that is suitable in all applications. This is why we have ensured we maintain the skills and accreditation to fit all of the common lagging systems used in the Australian market.

Our new build and rebuild facilities in Perth, Mackay and Newcastle both have Autoclaves that allow us to fit Hot Vulcanised Lagging systems. Indeed all lagging is performed in house, with the exception of Cast Polyurethane Lagging where we use trusted specialist applicators to install this lagging on our behalf.

## PROK Pulley Lagging

PROK offer a range of Pulley Lagging options to suit every situation, including customised systems.

If you're not sure what the right solution is for your Pulleys let PROK find the best option for your operating environment, budget and performance expectations.

## Rubber Pulley Lagging

PROK Abrasive Resistant Rubber Lagging is the most cost-effective lagging solution in most applications.

- Good Abrasion Resistance
- Good Dry Drive Traction
- Good Wet Drive Traction (When Grooved)
- Good Belt Cushioning and Impact Protection
- Good Self-Cleaning Properties
- Very Good Bond Strength and Durability
- Low Cost Lagging System
- FRAS option available

Available in Plain Rubber, Standard Diamond Groove as well as Customer and Application Specific Groove Profiles & Patterns.



Extreme lagging is available for High Tension Belt Pulleys that suffer from significant abrasive wear.

PROK Rubber Lagging is Hot Vulcanised to the Pulley Shell giving superior bond strength and a fully sealed interface between the lagging panels and the pulley shell. PROK does not recommend the use of Cold Bonded Pulley Lagging systems.

## Polyurethane Lagging

Polyurethane is a more costly option than Rubber, however it offers improved resistance to abrasive wear over the standard Abrasive Resistant Rubber Lagging.

- Very Good Abrasion Resistance
- Good Dry Drive Traction
- Good Wet Drive Traction (When Grooved)
- Moderate Belt Cushioning & Impact Protection
- Very Good Self-Cleaning Properties
- Good Bond Strength and Durability
- Moderate to High Cost Lagging System
- FRAS option available

Available in Plain, Standard Diamond Groove as well as Customer and Application Specific Groove Profiles & Patterns.

Hot Vulcanised Polyurethane Lagging, is a hybrid system, featuring Polyurethane Bars cast into a Rubber backing panel. This system offers a lower cost alternative to normal Hot Cast Polyurethane, as the lagging does not require the fabrication of expensive moulds and material wastage from the casting process. It also offers improved Belt Cushioning compared to Cast Polyurethane.

## Ceramic Lagging

Ceramic lagging has two key advantages over other lagging systems – the ceramic tiles are extremely abrasion resistant, and for drive pulleys “dimpled” ceramic lagging can provide significant improvements in traction over alternatives such as Rubber and Polyurethane.

Ceramic Lagging comes in two forms, Direct Bonded and Rubber Backed, each with differing properties.

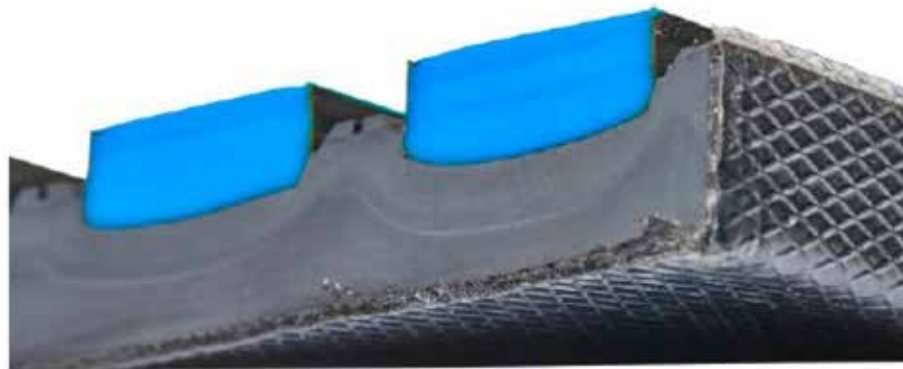
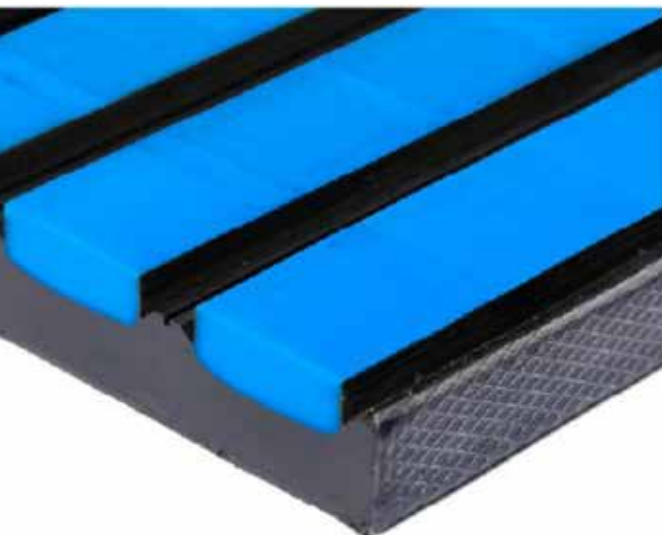
PROK only uses Ceramic Lagging that features high grade Alumina Oxide tiles, providing the maximum wear life from our lagging. Tiles are available in Plain / Smooth, for Non-Drive Pulleys, and Dimpled, for Drive Pulley applications.

## Direct Bond Ceramic Lagging

Features tiles directly bonded to the pulley surface, and then grouted, using a specifically developed epoxy adhesive.

- Exceptional Abrasion Resistance
- Exceptional Dry Drive Traction (Dimpled type)
- Exceptional Wet Drive Traction (Dimpled type, when drainage grooves fitted)
- Exceptional Bond Strength and Durability

Tiles are available in a range of sizes and shapes, that can be fitted providing full coverage of the Pulley Face or arranged to provide drainage channels.





## Rubber Backed Ceramic Lagging

Designed to address some of the limitations of Direct Bond Ceramic Lagging and the traditional Cold Bonded Ceramic Lagging systems. The same high-quality tiles are embedded into a rubber backing material, that is then Hot Vulcanised to the Pulley Shell, providing a degree of cushioning from impact and allowing the tiles to compensate for belt contraction on Drive Pulleys.

PROK recommends Rubber Backed Ceramic Lagging for its exceptional tile to rubber, and rubber to pulley shell, bonding systems.

This lagging is also available with Plain / Smooth or Dimpled tiles.

- Exceptional Abrasion Resistance
- Exceptional Dry Drive Traction (Dimpled type)
- Exceptional Wet Drive Traction (Dimpled type)
- Some Belt Cushioning and Impact Protection
- Very Good Bond Strength and Durability
- High Cost Lagging System
- Poor Self-Cleaning Properties – Dimpled Tiles especially prone to build-up
- Low Risk of Belt Slip on Drive Pulleys causing High Belt Wear or Damage

In response PROK developed a HVCL product that solved the problems associated with Rubber Backed Ceramic Lagging – Poor Shell Bond Strength and Tile Loss.

This product has been specifically developed and tested to greatly improve the durability and strength of the bonding of the Lagging to the Pulley Shell and the Ceramic Tiles to Rubber Backing Panel. The end result is a product that achieves an exceptional balance between durability, drive traction, abrasion resistance and cushioning. The rubber backing layer is critical in certain drive pulley applications to control the risk of belt slip and belt cover damage.

PROK has the tools available to assess applications to ensure that the right lagging thickness is specified to protect your belt and eliminate the risk of drive slip.

This lagging is available with either Dimpled / Pimpled or Plain tiles.

Beware of imitations! Only PROK HVCL has been specifically designed and manufactured to be Hot Vulcanised to the pulley shell. Many in the market are offering traditional CBCL systems that are then bonded onto the pulley using a Hot Vulcanised Bonding layer ... this is NOT the same product, that doesn't have the improved tile bond that is a key feature and often uses rubber compounds that are not suitable for steam curing.





# Pulley Enviropeel

## About Enviropeel and the equipment at PROK

Enviropeel is a unique re-usable thermo-plastic barrier coating system. The raw product is heated in a specially designed mobile application unit and sprayed as a liquid onto any size component. The Enviropeel cools to a solid in seconds.

PROK performs this enhanced protective coating spray on application for non-drive and drive pulley bearings and drive pulley shaft extensions.

PROK qualified applicators have been trained and certified to apply Enviropeel by the OEM.

## Benefits and properties

Enviropeel provides active protection from corrosion, with its inhibiting oil coating all internal surfaces, to protect the components under the coating from corrosion.

Enviropeel prevents against ingress of moisture and contaminants by forming a perfectly fitting and durable barrier.

Enviropeel is supplied in grey as standard, however it can be manufactured in a range of colours to suit any requirement.

Further benefits of Enviropeel include:

- Reduces wear and tear
- Long-term active protection
- Extended component life
- Recyclable and waste free
- Environmentally friendly
- No harmful chemicals

## Testing

Enviropeel has undertaken a variety of tests including:

- ASTM B117 Hot salt fog testing showed that areas within the Enviropeel protection zone stayed in perfect condition
- Cryogenic, accelerated UV pinhole and film integrity test showed outstanding corrosion protection in a variety of aggressive environments
- Field trials for US Coastguard proved Enviropeel's performance on the high seas leading to its adoption for bolting protection on USCG vessels and LPG Tankers

## Applications

Enviropeel can be applied to a range of components:

- Bearing housings
- Couplings
- Pulley Shafts, especially the Bearing, Locking Assembly and Coupling Journals
- Gearboxes
- Pulley End Discs & Locking Assemblies
- Bolt caps
- Virtually any spare components where corrosion is a risk.

## Partial Refurbishment

Due to time or financial constraints a fully refurbished pulley is not always practical. PROK Pulley Service Centres can provide specific works such as:

- Bearing and seal replacement
- Locking element replacement
- Shell re-lagging
- Painting and protective coatings

## Locking Assembly Torqueing

PROK uses the most technologically advanced methods for accurately tightening the locking element bolts. By using electronic torque equipment, in conjunction with normal mechanically calibrated torque wrenches, it ensures that the bolts are tightened to the correct torque limit, by programming the tool to its desired value.

It features a dynamic brake system to avoid torque over-shoot due to motor inertia and provides the operator with an electronic copy of the torque certificate for each individual bolts final torque measurement, to ensure QA/QC.

## Paint Options

PROK has in-house abrasive blasting and fully protective paint coating capabilities, with qualified and experienced painters to meet any customer's required specifications.

Our in-house facilities have excellent surface treatment equipment to handle all steel treatment requirements, from a basic zinc primer to a full paint system coating or customised spray treatment.





## Strip Report

A pulley condition report is provided detailing the current condition of the pulley shell, pulley shaft, lagging, bearings and housings, locking assembly and protective coatings.

## Warranty

PROK have the proven ability to rebuild conveyor pulleys to as-new condition, aligned to PROK OEM specifications and standards, with our full refurbishment warranty.



## Experience

PROK has the capability to manufacture and refurbish any pulley currently installed in any location worldwide. Typically this will include pulleys up to 2.6 m diameter and up to 30 metric tonnes in weight.

We have the ability to manufacture and refurbish pulleys up to 40 metric tonnes. If you have a requirement to refurbish large pulleys talk to us so we can have our skilled engineers and technicians evaluate your requirements in more detail.

A conveyor pulley can be an expensive and highly loaded piece of equipment. Therefore it needs to be correctly manufactured and maintained to ensure that it operates safely and productively.

PROK have world class experience in this field. Use our experience to eliminate the risk to your business that is posed by sub-standard Refurbished Pulleys.



# Pulley Vibration Analysis

## Application

Vibration analysis has historically been used in predictive maintenance strategies across a variety of different industries for the purpose of early fault detection resulting in a reduction of maintenance cost and downtime.

Analysing data from multiple transducers in the context of rotational speed can allow technicians to identify underlying faults which would normally be undetected until there is a failure.

The same principle is applied in PROK Pulley Vibration Analysis which can be performed on new and existing pulleys where customers want a quantifiable measure of assembly quality and confidence that they have defect free bearings prior to dispatch.

## Key benefits

- Confirmation of pulley assembly quality
- Early identification of defects such as:
  - Rolling element bearing faults
  - Eccentricity
  - Out of balance
  - Insufficient lubrication
  - Component looseness
- Compatible with Independent testing contractors
- Applicable to a wide range of pulley sizes
- Verified baseline vibration values

Especially relevant on speed pulleys operating at over 150rpm. Testing is performed with reference to ISO 1940-1

- Numerous engineered safety mechanisms for operation.

## Testing Facilities

PROK have the most comprehensive capability in the market when it comes to Vibration Acceptance Testing of Pulleys, with two bespoke Pulley Test Rigs, designed to accommodate every pulley on the market today.

The PROK Pulley Test Rigs have been designed and built to minimise the impact of structural harmonics and extraneous background noise, with highly rigid structures and machines mounted on engineered footings.

Using mechanically tensioned conveyor belting (Drive Belt) to load and drive the pulleys ensures that the bearings are sufficiently loaded to eliminate the risk of skating or sliding of the rolling elements – failing to ensure this can result in damage to the bearings during testing. While maintaining a close to 180° Angle of Wrap of the Drive Belt over the pulley shell ensures evenly distributed stresses over the pulley shell during testing, closely replicating how the pulley is loaded when in operation.

Both Test Rigs are fitted with high resolution load cells so that the forces applied to the pulley are accurately measured during testing, while also being fitted to speed, temperature and vibration instrumentation to identify any potential bearing issues during the run-in phase of the test cycle.

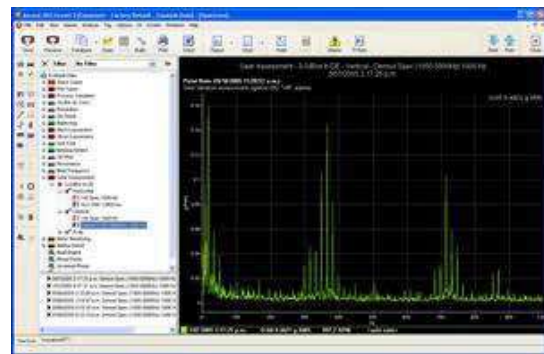
Not only are our Pulley Test Rigs highly capable, they have been built with operator safety as a core focus, featuring interlocked exclusion zones and remote operations panels that ensure all personnel are clear of the rotating pulley and belt drive whenever the machines are operating.

For Pulleys operating at high rotational speeds, nominally over 200 rpm, PROK are also able to offer Dynamic Balancing of pulleys.

## In-house testing capability

While PROK currently use independent subcontractors to conduct acceptance testing to customer specification, PROK's own production team have the capability and equipment to conduct in-house testing.

Using our Commtest data acquisition hardware and its award winning Ascent Level 2 Vibration Analysis Software, we can both analyse and manage storage of vibration data collected.



# Dynamic Balancing

## Application

PROK has full in-house capability to dynamically balance Pulleys up to 30,000 kg using the latest technology in precision balancing.

Our dynamic balancing equipment balance to relevant ISO Standards and provide a comprehensive balancing report that documents compliance with these international standards, as per customer's requirements to meet their specifications.

Dynamic Balancing is recommended for all pulleys operating at 200 rpm or higher.

## Key benefits

Dynamically balancing is the most economical method for correction to imbalance of Pulleys.

- Increase bearing life
- Reduction in noise
- Reduced vibrations
- Reduced stress on structural mounting supports

# Pulley Upgrade options

A variety of upgrades and options can be supplied for pulleys to improve their performance and reliability in the conditions presented by your specific operating environment. Some of our more common upgrades include:

- Upgraded bearing housing seals
- Modern bearing housings that are lighter and more rigid
- Upgraded protective coatings, such as polyurethane end disc coating
- Revised lagging type:
  - Hot vulcanised rubber lagging with standard or customised groove patterns - HVL
  - Hot vulcanised rubber backed ceramic lagging - HVCL
  - Cold bonded rubber strip lagging - CBL
  - Cold bonded rubber backed ceramic lagging - CBCL
- Direct bonded ceramic - DBCL
- Cast or strip polyurethane
- Specialised Lagging Solutions for specific applications
- Addition of speed flags
- Addition of Corrosion Protection for Locking Assemblies, options include Cover Plates with
- Ring Sealing and Waterproof Polyurethane Coatings
- Heavy duty (certified) transport / storage cradles or special cradles to client design
- Storage protection, including options such as anti-corrosion plastic wrap or other coatings and surface protection systems

Where operating conditions have changed PROK can provide a design review service, to align the pulley specification with your requirements.

The normal service fee will be waived where a pulley is upgraded or a new pulley ordered.



# PROK

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