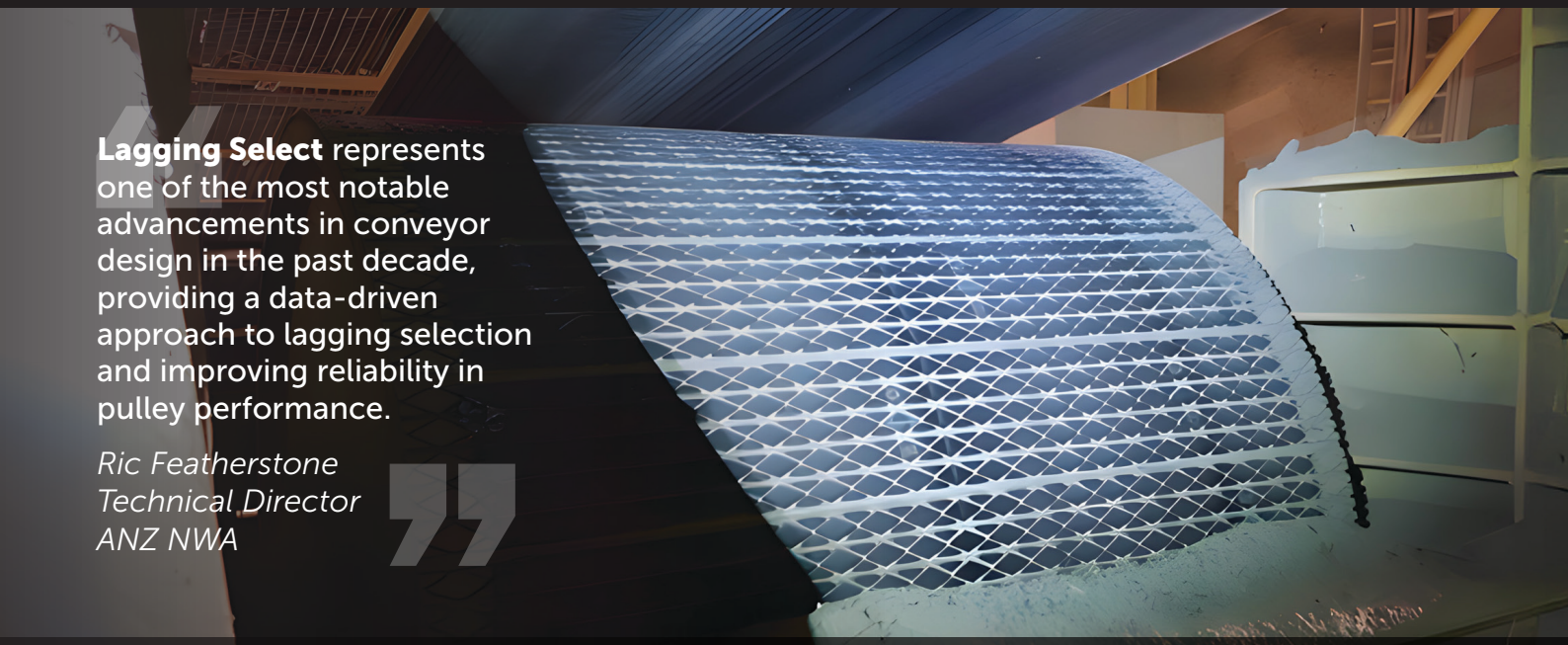


Lagging Select represents one of the most notable advancements in conveyor design in the past decade, providing a data-driven approach to lagging selection and improving reliability in pulley performance.

Ric Featherstone
Technical Director
ANZ NWA

CASE STUDY: HOW LAGGING SELECT CAN DE-RISK AN ENTIRE MINING OPERATION

In 2021, a major Australian gold mine upgraded its underground conveyor system to increase throughput from 4,600 to 5,150 tph, including a belt change from ST 5600 to ST 6300 - the heaviest duty belt in the country. The drift conveyors used dual-drive pulleys with 25mm rubber lagging (65 Shore A), which had performed reliably in the past.

During the upgrade, the same lagging was reused based on historical success, as no analysis tools were available to assess its suitability for the increased stresses introduced by the new operating conditions. What resulted, was a catastrophic lagging failure which cost the mine AUD $21M in lost production.

LOCATION:	New South Wales
YEAR:	2021
APPLIC.:	Lagging – rubber lagging 25mm thick
SOLUTION:	Lagging Select

ISSUES ON SITE:

Just four weeks after commissioning, both drive pulleys suffered catastrophic lagging failure, resulting in three days of unplanned downtime and AUD $21 Million in lost production. Despite the minimal cost of the lagging itself (<AUD $10,000), no analysis was done to confirm its suitability for the upgraded load.

Lagging was selected based on previous specs - 25mm thick rubber at 65 Shore A - with two different application methods and grooving styles. Both failed under the new operating stresses, highlighting the critical need for engineering validation over historical assumptions.

Lagging failures on two drives after 4 weeks in operation post upgrade:

Failure of one of the drives with moulded small diamond rubber. Diamonds showed signs of melting,

Failure of other drive with calendared rubber in layers and hand grooved. Lagging showing signs of delamination.

LAGGING SELECT – AN INDUSTRY FIRST

To determine the root cause of the diamond lagging failure, and determine the options for lagging types that would eliminate this failure, Elastotec engaged Conveyor Dynamics USA an experienced conveyor design company.

CONVEYOR DYNAMICS

The brief was to analyse the conveyor operating conditions before and after the belt change to try to determine the factor that had caused the rapid lagging failure. Once this was done the brief was to analyse a range of lagging options to determine a suitable replacement lagging that would provide a service life >5 years.

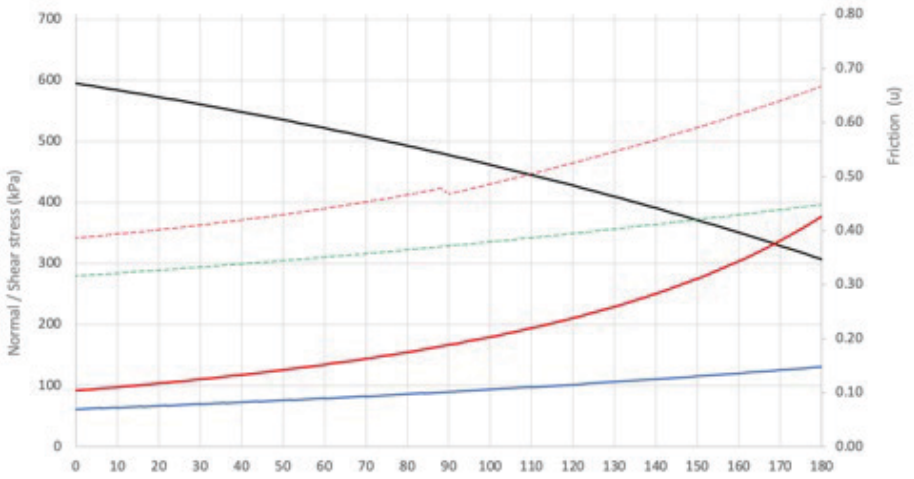
The initial work done by CDI looked at the possibility of slippage - either bulk slippage or localised slippage - both of these were eliminated as the cause of the lagging failure.

Next came an analysis of the lagging fatigue limits - the dynamic rubber properties for each lagging and the CAD model were inputs into an FEA program that was able to replicate the cyclic stresses present during operation. The FEA analysis clearly showed that fatigue was the root cause of the lagging failure. From that point on the focus was on a lagging design that was more robust to cyclic stresses - after FEA analysis of many different lagging types a 25mm thick fully moulded hot vulcanised rubber lagging with herringbone grooving was giving the best results.

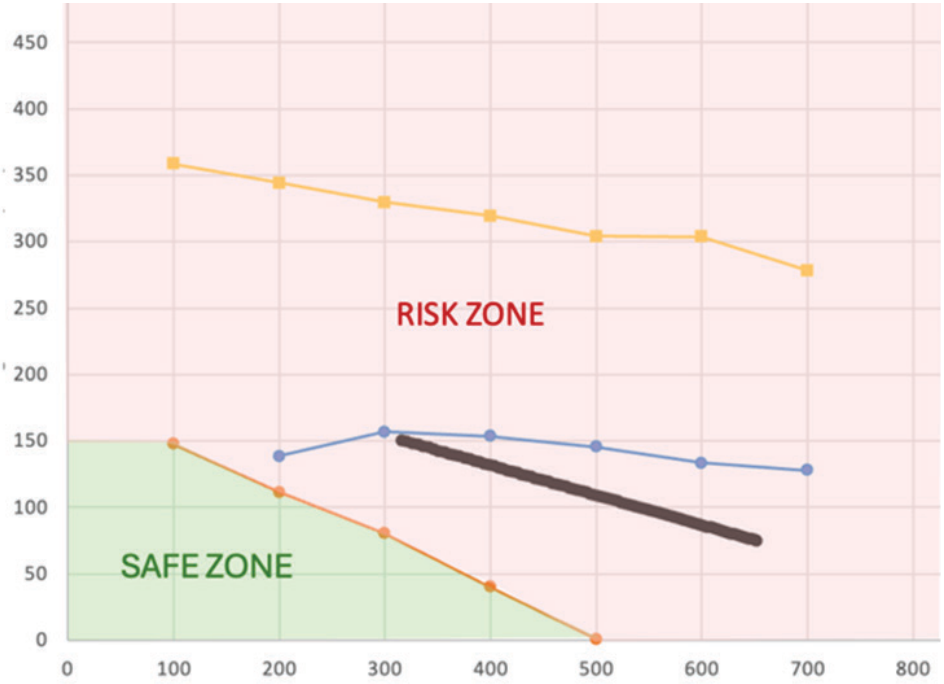
THE UNIVERSITY OF NEWCASTLE AUSTRALIA

Endurica
Get Durability Right®

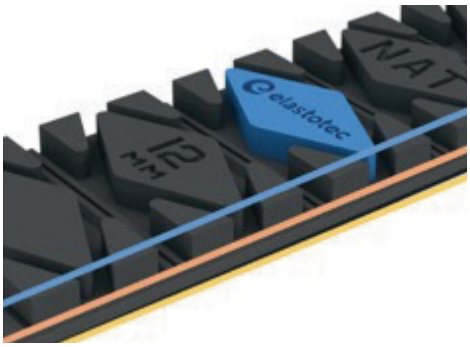
In the below table, the analysis showed no signs of theoretical slip. The graph confirmed that the developed friction (red solid line) remained below both the green and red dotted lines, which represent friction limits under various operating conditions. This aligned with visual observations—the lagging wasn't worn, but showed signs of melting and delamination.

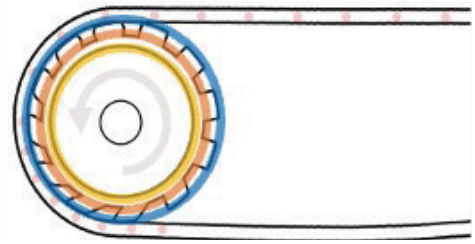


Slip analysis due to belt contracture for the case study. Graph showing no localised slip.

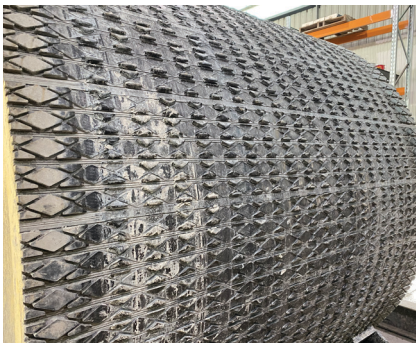


26%	Pulley shell shear stress util
31%	Contact face shear stress util
130%	**Tread root shear stress util**





Stresses in the application compared to the fatigue limit of every section of the lagging



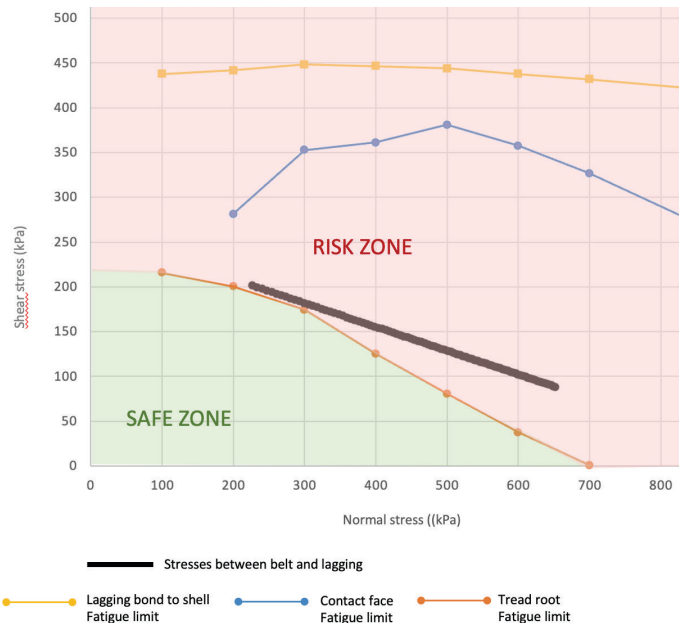
THE SOLUTION:

With ceramic lagging not an option, Elastotec was tasked with engineering a rubber-only solution that could survive under the new, more demanding conditions. Using Lagging Select, the team evaluated multiple designs to find the most fatigue-resistant configuration.

The outcome was a Herringbone lagging design, featuring:

- **Shallow, rounded grooves to reduce stress concentration**
- **A full moulded rubber block, eliminating layer delamination risk**
- **95% contact area with the belt, reducing localised fatigue**

This solution marked a step-change in lagging design—replacing assumption-based selection with analytical precision. The redesigned lagging has now delivered over two years of reliable service, compared to just 4 weeks with the original design.



THE RESULTS:

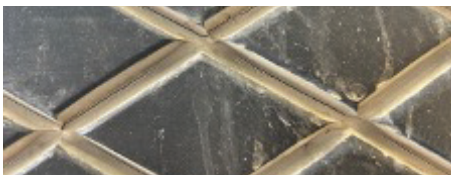
The redesigned Chevron lagging was successfully implemented on both drive pulleys. Post installation, the new lagging operated reliably for over two years without failure, compared to just four weeks with the previous design. This dramatic improvement highlights the value of detailed engineering analysis and the role of **Lagging Select** in optimising lagging performance under increased operational loads.

While fatigue does still occur over time, it now develops on a predictable two-year timeline, allowing the site to plan maintenance in advance—avoiding unplanned shutdowns and costly production losses. This case not only prevented further catastrophic failure but also marked a shift toward more durable, engineered lagging solutions designed for real-world conditions.

Lagging life extended from **4 weeks to 2+ years**	Avoided a total of **AUD $21M** in production loss	**De-Risk** conveyor assets, and production
Contact area boosted from **43% to 95%**	First-ever industry use of **Lagging Select** or fatigue-optimised lagging design	laggingselect™

Other pulleys on other applications also showing signs of fatigue

6MW Drive NSW, Australia,
Melting of rubber



20MW, Copper, Chile.
Rubber cracks inside grooves

5MW, Coal, NSW, Australia.
Rubber melting

ONGOING DEVELOPMENT & INDUSTRY IMPACT

This case marked a true turning point for the entire conveyor industry, in more ways than one.

What began as a root cause investigation, has rapidly evolved into a game-changing predictive tool for lagging applications, but also overall conveyor design - with belt and pulley manufacturers, engineering firms, and design consultants.

Lagging Select is now a critical part of the decision process—supporting and validating the design of often longer, more efficient conveyors. Ric Featherson of AECOM additionally remarked,

"While the industry has seen broader innovation across digital integration, energy efficiency, and materials, Lagging Select stands out as a targeted and practical tool addressing a longstanding design challenge."

The tool has since expanded to feature specialised modules — such as slip, fatigue, and drive analysis — making it uniquely capable of assessing risk and improving reliability across entire conveyor systems. While lagging represents a small fraction of total project costs, it is often a critical pinch point that can affect an entire mining operation. Mining companies using Lagging Select have been able to update forecasts, de-risk assets, and optimise performance.

Looking ahead, Elastotec has committed to continued investment in Lagging Select, focusing on real-world performance and end-user value. As the tool gains broader adoption, it's not just improving conveyor reliability—it's reshaping how the mining industry approaches asset design and long-term operational forecasting.