

CARRYBACK NO MATCH FOR BELT CLEANING SYSTEM UPGRADES

How Port Kembla Coal Terminal and Flexco worked together to improve safety, operating and environmental performance, and reliability of the belt cleaning systems

At Port Kembla Coal Terminal (PKCT), carryback and spillage generally occurs due to inadequate belt cleaning. A large proportion of the existing materials handling systems were based on older and less efficient technology. As such, PKCT identified various opportunities where improvements to the existing belt cleaning systems could be implemented to improve their safety, operating and environmental performance, as well as their reliability.

The belt cleaning system upgrades are part of the larger restoration and compliance project undertaken at PKCT sought to improve and modernise their conveyor belt cleaning systems to achieve improvements in carryback, spillage, belt cleaning, belt wear, maintainability and dust control.

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Mitch Harm, Basic Design and Execution from Project Portfolio Management (PPM), was a key member of the team in charge of the planning and execution of the Port Kembla Coal Terminal conveyor NC14 spillage reduction project.

PORT KEMBLA COAL TERMINAL IN NEW SOUTH WALES

Port Kembla Coal Terminal is a key coal exporting facility on the east coast of Australia, 72km south of Sydney. It services two of the nation's richest coal reserves, the southern and western coalfields of New South Wales, exporting high-quality coking and steaming coal to customers around the world.

Bruce Chapple, PKCT customer representative, Mitch Harm, Basic Design and Execution, and Shannon Ballard, Detailed Design, from Project Portfolio Management (PPM), were the personnel in charge of the planning and execution of the Port Kembla Coal Terminal conveyor NC14 spillage reduction project.

"The project created various opportunities for the terminal to implement improvements to our systems, to increase safety, operating and environmental performance, and reliability," Harm said.

TACKLING THE CARRYBACK ISSUES

One problematic conveyor was creating substantial carryback issues for the terminal. NC14 is a critical conveyor spanning 383 metres in length, running parallel to the harbour and feeding the sites two ship loaders. It is a 2,000 mm wide, 20 mm thick conveyor belt, running 5.5 metres per second and with the capacity to carry up to 6,600 tonnes per hour of either thermal or coking coal.

According to both Harm and Ballard, conveyor NC14 had extensive carryback material spreading along its full length.

"This created further issues as the carryback material resulted in spillage, slip hazards, and environmental issues," Harm said.

It was the constant build up underneath the length of the conveyor that caused the most issues. Not only was the area a slip hazard for site personnel, but considerable time was spent by maintenance crews hosing down the area to control dust emissions.

While the conveyor did have belt cleaning systems installed, it was 1980's technology and was ineffective at combating the considerable carryback and spillage along the beltline. The original primary cleaner and spray secondary cleaner both had bolt tensioners and were difficult to maintain.

Carryback testing was undertaken by Flexco on the conveyor in its current state and with a range of coal types, which determined carryback levels to be an average of 32 kilograms per hour.



The custom-engineered wash box during installation on conveyor NC14 at Port Kembla Coal Terminal.

"PKCT identified that a good belt cleaning system performs at around four kilograms per hour, however, our specific goal was to reduce carryback on NC14 to less than two kilograms per hour," Harm explained.

It was these problems that led to a complete overhaul of belt cleaning systems on NC14 inclusive of primary and secondary belt cleaners, spray bars, and a custom-built belt wash station.

PKCT had done their research and knew they wanted to implement a belt wash station on NC14. After realising Flexco had a standard wash box design, they discussed the suitability of the standard design with Josh Abberton, New New South Wales Territory Manager at Flexco.

It was determined the Flexco standard wash box design was not suitable for the positioning on NC14 and, after conducting extensive research at other coal ports in Queensland, PKCT held a decision analysis with the purpose of deciding on a wash box preferred solution. The outcome of the decision analysis determined a custom-built wash box incorporating the use of 'squeegee rollers' would be better suited to the application. This was primarily due to seeing the proven success with this style of wash box at other coal terminals which resulted in consistently low levels of carryback.

"The main difference between the two options that were being considered is the standard wash box design incorporates additional scrapers into the box without the use of squeegee rollers, whereas the custom-built wash box, and the ones used at these Queensland coal terminals to great success, use one or more belt cleaners with multiple squeegee rollers inside the wash box, which is positioned after the primary and secondary belt cleaners on the belt," Abberton explains.

"After PKCT obtained information from other coal terminals, we found that these sites utilise squeegee rollers to great success. We determined that utilising squeegee rollers would help us achieve the belt cleanliness levels we needed on NC14," Harm said.

Since the Flexco standard wash box is designed and manufactured from scratch by in-house engineers, PKCT knew Flexco had the capability and expertise to design a custom wash box with squeegee rollers to the specifications requested by Port Kembla Coal Terminal and unique to the application required for conveyor NC14.



The custom-engineered wash box approximately 8 months after installation, helping to reduce carryback by 94%.



The H-Type Heavy-Duty Primary cleaner with PCST Spring Tension installed on conveyor NC14, viewed through the Flexco Inspection Door.

Thus, Flexco was commissioned by PKCT to design, manufacture and supply the wash box for PKCT while placing paramount importance on the health, safety, environmental and technical requirements described in the specification by PKCT. Flexco was also commissioned to supply additional belt cleaning equipment for NC14 as part of the overall restoration of the conveyor cleaning systems.

GETTING TECHNICAL

Several technical requirements were specified by PKCT, namely that all belt cleaners should be configured to allow for easy access to all points requiring inspection, adjustment, maintenance and repairs. The configuration must also allow for safe access when replacing components, including inspection doors and chute cut-outs for inspection and adjustment when the conveyor system is operating.

"We also needed all equipment supplied by Flexco to be maintainable within a three-day shutdown period, occurring quarterly," Ballard said.

Flexco designed, manufactured and supplied a custom wash box containing four squeegee rollers which work by adding slight deflection to the belt to assist in removing water and carryback. The wash box also incorporates two spray bars which provide the water necessary to remove the stubborn product from the belt. There is also one U-Type® heavy-duty secondary cleaner, specifically chosen as it provides the highest cleaning efficiency – especially in tough applications requiring the removal of water or sticky carryback materials.

The stainless-steel wash box and recovery system was mounted on the return side of the belt at the head end of the NC14 conveyor. Before the belt washing station, a Flexco heavy-duty H-Type® primary cleaner with spring tension system was installed at the head pulley, designed to remove the bulk of the carryback from the belt. The dual compression spring tensioners maintain uniform, constant blade tension to the belt and makes visually checking the tension easy and safe, essentially adhering to the important safety requirements stipulated by PKCT.



The Flexco Inspection Door installed on the head chute of NC14, allowing safe and easy visual inspection of belt cleaners while the system is running.

Teaming up with the Flexco H-Type® primary cleaner are two MHS Enhanced Service Advantage Cartridge heavy-duty secondary cleaners. With the proven and patented PowerFlex cushion, the MHS ESAC secondary cleaners deliver highly efficient cleaning in the most difficult environments. The service advantage cartridge can be easily removed and replaced, even in the dirtiest conditions, another critical feature to PKCT to ensure fast, easy, and most importantly, safe maintenance.

Overall, the new belt cleaning systems were going to be a tough defence against carryback, but the real test was when subsequent carryback testing was conducted over the several months following the equipment being installed.

CARRYBACK REDUCED BY 94%

Carryback testing conducted before the belt cleaning system was updated on NC14 measured an average of 32 kilograms per hour.

Port Kembla Coal Terminal's specific goal was to reduce carryback to a minimal 2 kilograms per hour. After the new belt cleaning equipment was installed and commissioned, the same carryback tests were conducted over a period of several months to see how much carryback had been reduced on the belt.

Carryback measurements taken after the upgrade of NC14 produced an average of 2 kilograms of carryback per hour, meeting PKCT's specific carryback target. This is a total reduction of 30kg/hour. That's an enormous 720 kilograms reduction in coal spillage over a 24-hour period of the belt running. This is a huge amount of coal that is no longer spreading along the underside of the conveyor, spilling off the belt, damaging the conveyor system, causing environmental concerns and safety hazards for work crews.

The belt cleaning system upgrade on NC14 resulted in a reduction in carryback levels by 94%, effectively meeting all expectations and specifications, and tackling the carryback issues head on.

LOOKING TO THE FUTURE

The team at Port Kembla Coal Terminal are looking forward to the maintenance challenges in the future, with further work planned on site. Due to their extensive experience and their solid relationship with Flexco, they now have another trick up their sleeve when tackling future belt conveyor issues.

"We are really excited to be part of the restoration and compliance project at Port Kembla Coal Terminal, and we look forward to tackling the next belt conveyor issue on site with the excellent PKCT team, with the aim to implement safe solutions that increase productivity," Abberton said.

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