Condition Monitoring of Lined Piping Systems in a Coal Preparation Plant

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The Issue - Maintenance Needs for Aging Ceramic Lined Piping Systems

For many mines, ceramic lined piping systems in coal preparation plants have provided a reliable system that has been cost effective and involve minimal maintenance.

However, as time has passed many pipes are now reaching the end of their serviceable lives (5-15 years) and maintenance staff are faced with the quandary of whether to replace or reline the entire system, or components of it.

As a consequence, mines are unaware of the cost of pipe maintenance, and face potentially large investments in replacing or renewing the system.

Due to wear characteristics and plant location some pipes can be easily rotated or end-for-ended. This allows the effective life of a pipe to be extended as the entire ceramic lining is worn more evenly rather than wearing through in one place.

Without the use of an effective condition monitoring system, it is not possible to identify the maintenance requirements of individual pipes. This generally means that pipes are left in service until they wear through at one point, rendering the remaining ceramic lining useless.

The Solution – Effective Condition Monitoring Systems

At BHP Goonyella CPP, and many other coal preparation plants, Greenbank Piping Systems’ PIPESCAN is used to predict wear in lined piping systems and provide maintenance plans for optimal maintenance.

The system uses a unique Close Circuit TV (CCTV) pipe scanning probe and software package to scan the full inside circumference of the pipe and calculate percentage of wear. The required maintenance period and effective life of each pipe can then be determined. This is possible due to the homogenous nature of basalt and alumina, as well as its uniform thickness, allowing wear rates to be extrapolated and service periods determined.

Maintenance reports detailing a summary of the pipes scanned, the immediate action recommended and the predicted maintenance requirements for the following period are produced in tabulated format for ease of interpretation.

Alternative condition monitoring systems use ultrasonics, radiography, electric current (continuity) and internal visual inspection. The major limitation of these systems is that they cannot be used in composite materials and they can only predict localised wear.
The BHP Goonyella Experience

Prior to the introduction of PIPESCAN at BHP Goonyella CPP, maintenance staff were utilising a ‘visual only’ internal inspection system to determine their pipe maintenance requirements. This approach offered limited information to maintenance staff, only showing them which pipes had worn through and which pipes had damaged linings.

With the introduction of PIPESCAN, maintenance staff now have exact maintenance information provided to them in a tabulated format, allowing them to accurately plan their pipe maintenance requirements.

PIPESCAN Analysis Screen

From information recorded on site, our Pipescan Technician is able to take accurate measurements of a pipe’s inside diameter. These measurements are then entered into our database and from there the various PIPESCAN reports are generated.

It is this measurement system in conjunction with the visual recordings, wear calculations performed by the database and over 20 years experience designing and suppling lined piping systems, that enable us to predict maintenance requirements and service periods.
Key Benefits for BHP Goonyella CPP

With the aid of the Immediate Action Report, which is generated by PIPESCAN, fixed pricing can be obtained from subcontractors for pipe maintenance during shutdown periods. This greatly reduces the labour cost element and allows maintenance staff to have the required spares on site at the required time.

The Predicted Maintenance Report (detailing maintenance requirements for the following operational period) allows maintenance staff to produce accurate budgets for the required spares for the following operating period. It details the predicted time at which each pipe requires maintenance (if any). This reduces unscheduled outages due to pipe failure, increases plant availability and reduces inventory.

With the use of PIPESCAN, maintenance staff at BHP Goonyella CPP have been able to significantly reduce their shutdown maintenance bill for lined pipes. They are increasing the effective life of their pipes through planned routine maintenance and are on their way to reducing stock inventory and unscheduled plant outages due to pipe failure.

(Powerpoint presentation slides are also available from the Secretariat)