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FAILURE INVESTIGATION ON BROKEN SHAFT OF MAGNETIC SEPARATOR PULLEY IN COAL POWER PLANT.

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ABSTRACT

Magnetic Separator is designed to separate the ferrous materials from the coal. The coal is conveyed under the separator and the ferrous materials were removed magnetically. This is achieved by applying magnetic field through the moving magnetic belt of the separator, driven by two pulleys.

During its operation, the shaft was reported to be damaged as it was broken at the welded joint. An analysis has been carried out to the broken shaft and its system to investigate the root cause of the damage. There were few possible factors which might contribute to the failure such as restriction from the bearing connected to both ends of the shaft, sustenance of weight from the pulley by the shaft and etc.

There were no abnormalities found on the bearing attached to the shaft, which eliminates the bearing as one of the factor of the failure. The fracture surface of the shaft was then being analyzed. From this analysis, it was found that the shaft had undergone fatigue failure. The large portion of beach-marks area with the small area of final fracture surface indicated that it was a low nominal stress fatigue failure. The curve pattern of the beach-marks shows that the crack was traveling faster on the surface, which indicates that the failure is due to high stress concentration initiated from the weld toe.

From the analysis, it was concluded that the failure was initiated from the surface of the shaft at the weld toe which act as a stress raiser. Continued operation led to crack growth and eventual failure.