Project Summary - Spring 2017

BridgeGap Engineering – Positive Displacement Air seal

Overview
• Maintaining a gap within the separator while lowering the pressure difference between the two seals and controlling the airflow in a way that only the direction is changed, not the intensity.

Objectives
• Provide a positive seal to the rotating cage while ensuring the separator continues to function as intended.
• Deal with the airflow problem of the separator by the implementation of vanes, which can be either horizontal or curved, depending on the curvature of the duct within the separator. The vanes will hence ensure a straight, directed air flow within the duct.
• To find Pressure and volume of the air required to ensure that the lower seal is effective
• Calculate energy efficiency of system with air seal

Approach
• Research on the types of separators and mills
• Worked on the physics of the separator including equations, force balance between centrifugal, gravity and drag forces and research about how to develop an air seal
• Research about existing patents and products with similar working (QDK .etc )
• Research about vanes (number of vanes, angles) and how changing them leads to change in particle size
• Research on the parameters inside a cement separator (Pressure, volumetric flow, density of materials)
• Shortlisted positive displacement pumps. Contacted Ingersoll Rand and Christian Pfeiffer and asked for recommendations for the pump and gave them the data to select pump
• Research about energy efficiency of the air seal and energy gains by the closed circuit mill with air seal and vanes integrated together inside a HES

Outcomes
• Pressure of 0.359 psi and Volumetric flow of 588.7 cfm required to develop air seal
• Positive displacement pump and motor used to generate this air seal
• Change in efficiency of the closed circuit mill