

Dust free conveying – Development of a rail-running pipe conveyor

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ABSTRACT

The demand for steel products in modern society is prompting the iron ore industry to optimise their operations to ensure sustainability of fines and lump products. One of the key components in the iron ore transportation chain are belt conveyors. The energy consumption of modern belt conveying systems has reduced considerably over the past few decades, however, there is still significant scope for further reductions, especially when heavily loaded long overland belt conveyors are considered. A new rail based continuous bulk material transportation system has been developed by researchers at the University of Newcastle to reduce the energy consumption of heavily loaded and long overland conveyors. The Rail Conveyor technology is a state-of-the-art continuous belt conveying technology which provides an innovative and novel departure from conventional continuous bulk material transportation systems with significant energy and economic benefits.

This paper presents an overview of a Rail Conveyor variant which considers an enclosed belt. Enclosed belt conveying has the benefits of encapsulating the bulk material, and thereby reducing dust emissions and moisture ingress, in addition to being able to negotiate smaller radius horizontal and vertical curves leading to greater flexibility. To quantify the primary differences between conventional conveying technologies, the Denver office of thyssenkrupp Industrial Solutions (USA) developed a case study for an 11 km long conveyor. The conveyor design throughput was 2,750 tph and included a small net elevation loss of 10 m. When considering CAPEX the Rail-Running Pipe Conveyor equipment supply cost is approximately 45% of the cost of a conventional pipe conveyor, while savings upwards of \$US50M emerge for CAPEX combined with 5 years of OPEX. The savings vary with the topography and density of the bulk commodity, with iron ore generally showing increased savings because the high bulk density increases rubber losses in conventional conveyors.