ABSTRACT OF PAPER

Title of Paper *(limited to 15 words in CAPITALS):* **OPTIMIZATION OF PRODUCTION THROUGHPUT FOR HEAVY HAUL TRAINS IN A CAR DUMPER**

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Nominated Theme: Train Dynamics (longitudinal and braking)

Abstract *(max 350 words)***:**

The advent of longer and heavier ore trains has increased train separations attributable to high in-train forces. The indexing movements during car dumping cause high coupler forces throughout the train. The cyclic nature of these forces increases component fatigue, coupler failures and production delays. In order to optimize the balance between dumper throughput and coupler damage, a longitudinal dynamics model has been developed.

This paper outlines the features of the model and its application to optimize car dumping strategies for trains through a typical car dumper. The optimality criterion used is the maximization of production throughput (minimization of the dumping cycle-time) without compromising coupler damages.

A computer model of a heavy haul train is developed to highlight how coupler forces during car indexing are affected by altering the velocity profile of the positioner system (i.e.: the acceleration, retardation and plateau speed of the positioner system on coupler forces). Field measurements using instrumented ore cars (IOCs) were used for the validation of this in-train force model and for the characterization of car connection components.

The implications of operational changes such as increased train lengths and axles loads on total induced damage and production throughput are also studied. The importance of this work's findings for railway operations lies in reduced delays from split trains, increased coupler life and increased production throughput via a faster dumping operation.