

Black Lung Mining Co.

Haul Truck Optimization Plan

Request for Proposal

Version 2.0

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Document History

Version	When	Who	What
1.0	2014-01-14	Black Lung Mining Co.	Initial Drafting
1.1	2014-01-19	Black Lung Mining Co.	Final
2.0	2014-01-28	Black Lung Mining Co.	Revised Final Document

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1.0 Product Overview

At Black Lung Mining Co. we want to optimize our mining operations by retrieving data about our haul truck operations. Currently, we are facing a number of problems:

- Wait times at shovels are not evenly distributed causing severe delays for some drivers
 - These delays may in part be attributed to slow drivers
- There is no way to track load time, driver break time or 360 inspections
- There is no real-time location tracking for trucks
 - Rerouting is done verbally instead of on a detailed map on a screen
- Dangerous drivers are causing accidents on our site

We hope to use the data retrieved to reroute trucks, identify slow and fast trucks and drivers, minimize wear on engines, minimize idle time, and minimize travel to load ratio to generally improve the efficiency of our on-site hauling operations.

2.0 Project Objectives

The Haul Truck Optimization Plan must satisfy the following objectives:

- Reduce cost
- Improve safety
- Reroute bottleneck drivers
- Identify dangerous drivers
- Track truck locations

These objectives should be met through the implementation of a pit dispatch control interface, a truck driver interface, and a business improvement department interface.

Pit Dispatch Control Interface

The pit dispatch control interface must include the following data: truck ID, driver ID, driver speed, driver location, load weight, gas levels, tire pressure, idle time, and trucks per route. The interface for pit dispatch control must display data in a way that is quick and simple to access. Pit dispatch control should be able to notify drivers of any route changes by sending route change instructions to the truck driver interface.

Truck Driver Interface

In the truck interface, the data must be purely informative and presented in a non-interactive way. Data included in the truck interface should include maps of routes and locations, and shovel levels and locations, via a GPS system. Furthermore, the interface should display various route changes need be, and inform drivers of break time.

Business Improvement Department Interface

In the business improvement department interface, users should be able to view all data that is also available to pit dispatch control, but not be able to change the data in any way.

3.0 Current Systems

The current systems in effect to achieve these requirements include driver log books, live feed video cameras, CB radios and existing truck routes. The logbooks contain the date and time, which truck is used, and which route is taken. The dispatchers currently make decisions based on the logbook information and the live feed video cameras to optimize the routes for the trucks. If a correction needs to be made dispatch contacts the drivers by radio and instructs them on which new route to take.

4.0 Intended Users of the System

At our company there will be a number of different types of users interacting with the system in distinct ways. The four primary user groups include:

- Pit dispatch control
- The foreman
- Truck drivers
- The business improvement department

Pit dispatch control will be the primary user of our system since they are responsible for optimizing the use of our haul trucks. Their job is to constantly monitor all the data collected about our trucks such as location, fuel levels, driving speeds, etc. and to use this data to make daily operations more efficient and safe. They also monitor the use of shovels to ensure minimal wait times for trucks. All this information will be displayed visually to them through the new system.

The foreman oversees all active operations at the site. It is important that they can receive daily reports on operations. These reports will be used to evaluate workers' performance during their shift and adjust schedules to balance drivers of different skill levels.

The truck drivers are a different type of end user in that they will not be interacting with the system. Currently dispatch is required to contact truck drivers via CB radio to notify them of route changes or to adjust driving behaviour. As stated above, much - if not all - of this communication should be relayed through the drivers' interface to the system.

Lastly, our business improvement department is persistently looking for ways to optimize work flow and reduce cost. Consequently, they will need access to all the data we collect about our trucks and operations in order to make informed decisions.

5.0 Known Interaction With Systems Within or Outside the Organization

This product will also help support the decisions made by the business improvement department. The gathered data will be available for them to make informed decisions about the future of the company. These decisions include but are not limited to: new truck routes, better performing equipment and efficiency of employees. The system could also serve as a backup system tracking the weight of the raw ore being trucked.

The business improvement department currently works with their own system that allows them to visualize and work with large amounts of data collected over time in the form of charts, graphs, etc. Ideally the new system would interface directly with theirs so that new data collected is transferred on a daily basis rather than having them manually process this data as is currently being done.

6.0 Known Constraints to Development

There are three major constraints to the system outlined below. These constraints are important to keep the efficiency and integrity of the operation intact.

Drivers Should Not Be Able To Access Data

We want to prevent drivers from accessing information about other drivers. We wish to remove any unwarranted animosity among drivers from performance comparisons. This data is meant solely for the dispatch controller to optimize transportation along the mining routes.

Route Change Information Must Take Less Than 5 Seconds

Route change data sent from dispatch controllers to drivers must be received in less than 5 seconds. This ensures an adequate time frame to allow drivers to follow new route assignments.

Data Retrieval Must Be Real-Time (Less Than 1 Second)

The data from the trucks must be collected in real time so it can be monitored by the pit control crew. The crew needs current data to make informed decisions to help optimize routes, refueling and other safety concerns for the truck drivers. These informed decisions require timely and accurate data.

Budget

This project is to be completed within a \$500,000 budget.

7.0 Project Schedule

ID	Task Name	Start Date	End Date	Duration	Assigned To	Percent Complete
1	Release RFP to Market	2014-01-14	2014-01-20	1 Week	Black Lung Mining Co.	100%
2	Requirement Specification 1.0 (Developer Win Bid)	2014-01-23	2014-02-06	2 Weeks	Developer (Group 1)	0%
3	Requirements Specification 1.1 (Refine RS 1.0)	2014-02-06	2014-02-18	1 Week, 5 Days	Black Lung Mining Co.	0%
4	Requirements Specification 2.0	2014-02-20	2014-03-11	3 Weeks, 1 Day	Developer	0%
5	Prototype Demonstration	2014-03-06	2014-03-06	1 Day	Developer	0%
6	Prototype Feedback	2014-03-06	2014-03-06	1 Day	Black Lung Mining Co.	0%
7	Requirements Specification 2.1 (Refine RS 2.0)	2014-03-11	2014-03-13	2 Days	Black Lung Mining Co.	0%
8	Requirements Specification 3.0	2014-03-12	2014-04-03	3 Weeks, 1 Day	Developer	0%
9	Final Demo	2014-03-12	2014-04-03	3 Weeks, 1 Day	Developer	0%

8.0 Project Team

Black Lung Mining Co. consists of six motivated individuals and can be contacted at the following email and website:

Email: blacklungminingco@gmail.com
Website: <http://web.uvic.ca/~dprince/>

Darren Prince (Domain Expert)
Luuk Veenis (Driver)
Colson Driemel (Foreman)
Evan Rogers (Domain Expert)
Erik Afable (Pit Dispatch Control)
Breanne Gruenke (Pit Dispatch Control)

9.0 Glossary of Terms

CB Radio	Citizens Band Radio, i.e. short distance unrestricted radio band communication.
Pit Dispatch Control	Position which coordinates the truck movements around the mine.
Shovel	A power shovel is a bucket-equipped machine, usually electrically powered, used for digging and loading earth or fragmented rock and for mineral extraction.
Foreman	A person who supervises and directs other workers.