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Faculty of Engineering and Information Sciences

2009

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Publication Details

This conference paper was originally published as Viglione, L, Baafi, E, Hesami, A & Gibson, G, A Web-Based Database for Assessing Roadway Development Performance, in Aziz, N (ed), Coal 2009: Coal Operators' Conference, University of Wollongong & the Australasian Institute of Mining and Metallurgy, 2009, 108-112.

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A WEB-BASED DATABASE FOR ASSESSING ROADWAY DEVELOPMENT PERFORMANCE

Luke Viglione¹, Ernest Baafi¹, Amir Hesami¹ and Gary Gibson²

ABSTRACT: There are various inherent characteristics of roadway development practices which fundamentally influence their overall performance rates. As part of a strategy to improve roadway development performance in Australian longwall mines, Australian Coal Association Research Project (ACARP) has initiated a benchmarking study by surveying each longwall mines. A web-based relational database system which has been developed purposely to monitor the performance of Australia longwall roadway developments is described. The benchmark study is aimed at assessing both the physical and operational factors influence roadway development practices and their performance indicators.

INTRODUCTION

In responding to why some longwall roadway development rates are different among mines, Roadway Development Task Group (RDTG) of ACARP has initiated a benchmarking study to determine the correlation between roadway development practices and roadway development performances. Since 2006 mine operational survey data has been compiled using EXCEL spreadsheet and via an online web-based database management system. Statistical analysis of an earlier survey suggested that continuous miner units that achieved more than 1,750 m were units mining two-heading development. The same survey results showed that having six bolting rigs improves the probability of higher development metres, while having less than six bolting rigs heavily limits performance capability. Also, installing 1500 mm rib bolts also appears to limit development rates, with those continuous miners achieving higher production levels all installing 1200 mm rib bolts.

Unfortunately there has been a limited success in providing data due to lack of participation by many of longwall mines due to the amount of time required in completing the survey information. This paper describes a user friendly web-based online relational database system, *BenchDat*, with various functionalities aimed at reducing the amount of time required by the user to complete the mine operational and performance data. The model structure of *BenchDat* is shown in Figure 1. *BenchDat* has two main databases with the first database made up eight tables. The second database was created using Visual Studio (VS) and Active Server Pages (ASP) Net configuration with the usual fields and tables.

USING BENCHDAT SYSTEM

Upon logging onto *BenchDat* website, the image shown in Figure 2 is displayed for the user to update any changes to the mine's basic information. This includes the number of operating units of gateroads and mains. Once the mine's respondent details have been updated the main body of the database can be completed or updated by selecting each of the circled sections of Figure 3.

The basic information required from the mines is classified under:

- Mine Parameters
- Development Parameters
- Gas and Ventilation
- Shifts and Personnel
- Management of Development Performance
- Development Performance

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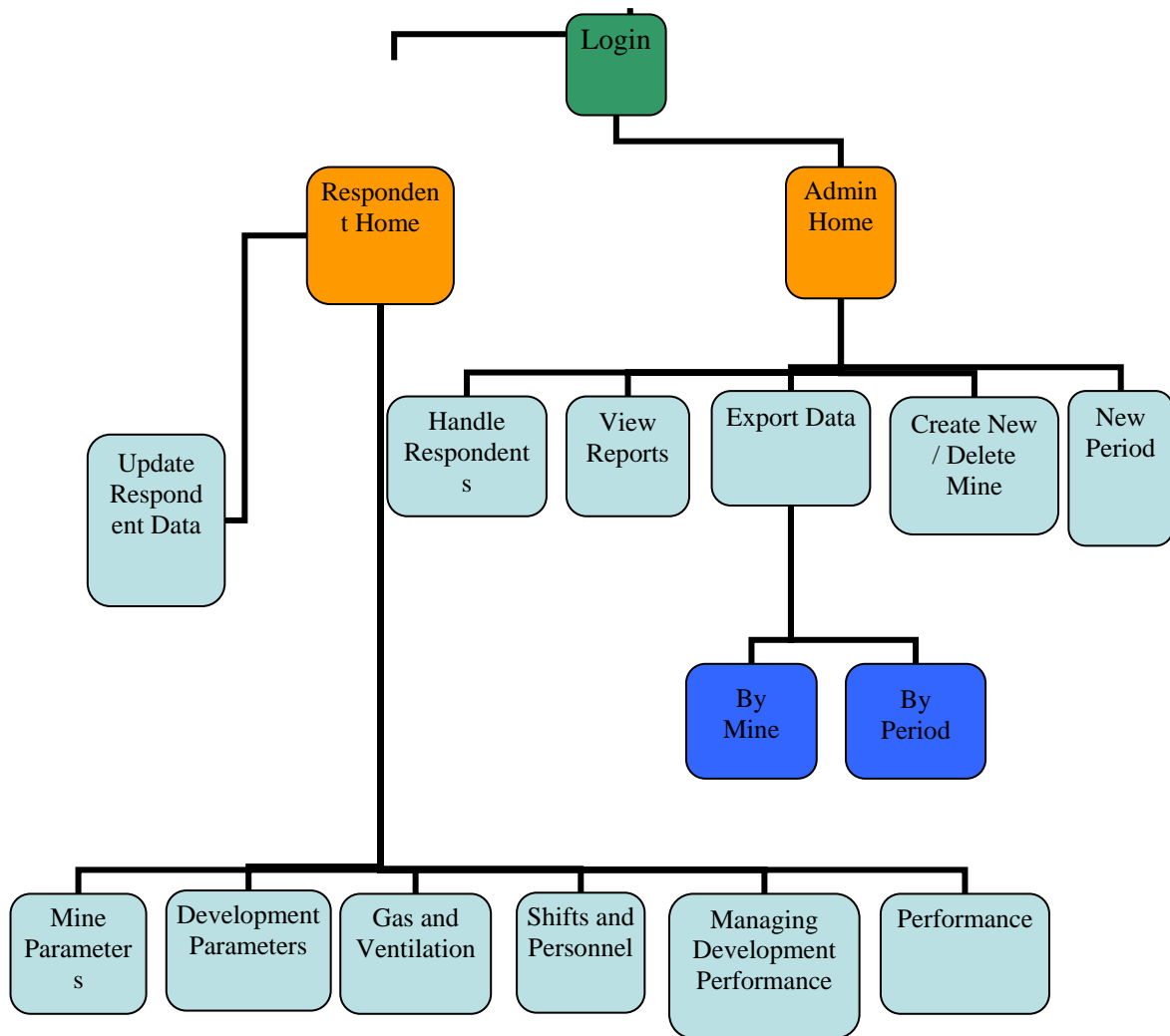


Figure 1 – Structure of BenchDat

The information required from mines under Development Performance option are:

Additional roof/rib support	Poor roof conditions
Floor conditions	Difficulty of mining conditions
Flitting equipment within panel	Supplies
Stone dusting	Pumping
Services installation and/or extension	Panel preparation
Belt extensions/panel moves	Panel relocation
Travel/transport delays	Training
Insufficient labour/manning levels	Absenteeism
Meetings and/or briefings	

Figure 2 – Home page of *BenchDat*

Figure 3 – Mine primary data input options

THE AUTO FILL FUNCTION

A mine with a number of units of gateroads or mains presents a tedious task of entering identical data for each unit. The **Auto Fill** tool of *BenchDat* system allows data from similar units with the same response to be entered once. To use this function the fields for the first unit information is filled and then select the **Auto Fill** box is clicked. The remaining fields are filled once the **Save** button is selected. An example of this is shown in Figure 5.

Some fields in the database only accept only numerical data. In the case that a text is entered into these fields an error message is displayed and the field in question highlighted in red for a correction by the respondent. After completing all the necessary mine data the user logs out from the system.

SHIFTS AND PERSONNEL PARAMETERS for Ulan		Mains Unit 1	Panel Unit 1	Panel Unit 2	Panel Unit 3	Panel Unit 4
1	Indicate the mines personnel and materials access	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Auto Fill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shaft haulage/winder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drift haulage/winder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Inclined drift/rubber tyred	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
In seam entry off highwall or outcrop		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Typical personnel travel distances and times between the surface muster area and the working faces (kms/minutes)		<input checked="" type="checkbox"/> Auto Fill			
	Distance (km)	4	9.8			
	Time (minutes)	20	40			
3	Typical material transport distances and times between the surface materials supply and loading area and the working faces		<input checked="" type="checkbox"/> Auto Fill			
	Distance (km)	4	9.8			
	Time (minutes)	20	90			
4	Material supply system utilised in face area <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> Auto Fill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	LHD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Trailers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Supply cassettes and/or pods	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	QDS loading attachments	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Manually transferred and loaded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Before Saving

SHIFTS AND PERSONNEL PARAMETERS for Ulan		Mains Unit 1	Panel Unit 1	Panel Unit 2	Panel Unit 3	Panel Unit 4
1	Indicate the mines personnel and materials access	<input checked="" type="checkbox"/>	<input type="checkbox"/> Auto Fill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Shaft haulage/winder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Drift haulage/winder	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Inclined drift/rubber tyred	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
In seam entry off highwall or outcrop		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Typical personnel travel distances and times between the surface muster area and the working faces (kms/minutes)		<input type="checkbox"/> Auto Fill			
	Distance (km)	4	9.8	9.8	9.6	9.2
	Time (minutes)	20	40	40	40	40
3	Typical material transport distances and times between the surface materials supply and loading area and the working faces		<input type="checkbox"/> Auto Fill			
	Distance (km)	4	9.8	9.8	9.6	9.2
	Time (minutes)	20	90	90	90	90
4	Material supply system utilised in face area <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> Auto Fill	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	LHD	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Trailers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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	QDS loading attachments	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Manually transferred and loaded	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

After Saving

Figure 5 – Auto Fill function

SYSTEM ADMINISTRATOR

The *BenchDat* database system has been designed to compile the annual development performance of Australia longwall mines. One of the roles of the system administrator is to reset the periods. This function involves first selecting the *Stop Period* button and then selecting the *Start New Period* button (refer to Figure 6). Other options made available to the system administrator include managing the contact details of the mine respondents, viewing responses and exporting data for statistical analysis. At any stage, the system administrator can easily determine which mines have responded and to what extent.

SSOCIATION RESEARCH PROGRAM

Welcome to the ACARP Roadway Development Database

[Logout](#)

Welcome: admin

You have logged in as Administrator, Be careful about the changes you make, they will be saved directly to the Data Base, You may loose some data.

Manage Users	Create Users
Reports	Stop Period
Start New Period	View Mines
View Mines by Date	

Figure 6 – System administrator menu

CONCLUDING REMARK

Future developments of *BenchDat* database include a detailed reporting structure for exporting compiled data to Microsoft Excel Comma-Separated-Value (csv) format for a comprehensive statistical analysis. The site will eventually reside at the industry's website *undergroundcoal.com.au* currently under construction. The development of *BenchDat* database was managed by Luke Viglione in partial fulfilment of the subject *ENGG371 Scholars Project 3* at University of Wollongong