A Web-Based Database for Assessing Roadway Development Performance

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A WEB-BASED DATABASE FOR ASSESSING ROADWAY DEVELOPMENT PERFORMANCE

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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
- Floor conditions
- Flitting equipment within panel
- Stone dusting
- Services installation and/or extension
- Belt extensions/panel moves
- Travel/transport delays
- Insufficient labour/manning levels
- Meetings and/or briefings

- Poor roof conditions
- Difficulty of mining conditions
- Supplies
- Pumping
- Panel preparation
- Panel relocation
- Training
- Absenteeism
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.

<table>
<thead>
<tr>
<th>SHIFTS AND PERSONNEL PARAMETERS for Unit</th>
<th>Panel Unit 1</th>
<th>Panel Unit 2</th>
<th>Panel Unit 3</th>
<th>Panel Unit 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicate the mine personnel and materials access</td>
<td>☑ Auto Fill</td>
<td>☑ Auto Fill</td>
<td>☑ Auto Fill</td>
<td>☑ Auto Fill</td>
</tr>
<tr>
<td>Drill handbag/welder</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Shift handbag/welder</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>Indicated equipment tried</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
<tr>
<td>In case entry of handbag or other</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
<td>☑</td>
</tr>
</tbody>
</table>

Before Saving

<table>
<thead>
<tr>
<th>Typical personal travel distances and times between the surface master area and the working faces (minutes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (m)</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

After Saving

<table>
<thead>
<tr>
<th>Typical material transport distances and times between the surface materials supply and loading area and the working faces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (m)</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Material supply system related in face area (Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini</td>
</tr>
</tbody>
</table>

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.
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.