CHAPTER 4 VALIDATION AND APPLICATION OF THE DEVELOPED COMPUTER PROGRAM

4.1 Validation of the computer program with actual field conditions

After the development of the computer program, the case study parameters were used for verifying the results under the prevalent field conditions. For evaluation of the efficacy of the computer graphics balancing diagram data, a critical comparison has been made with actual field conditions in different mine having horizontal and vertical mode of tandem operations. Three indices, namely the coal exposure, the percentage rehandle, and the linear advancement of both draglines, were computed from the respective three-dimensional balancing diagram. Figures 4.1 to 4.4 show the computer model generated three-dimensional balancing diagrams with various inputs and outputs of different mines encountered during the field study.

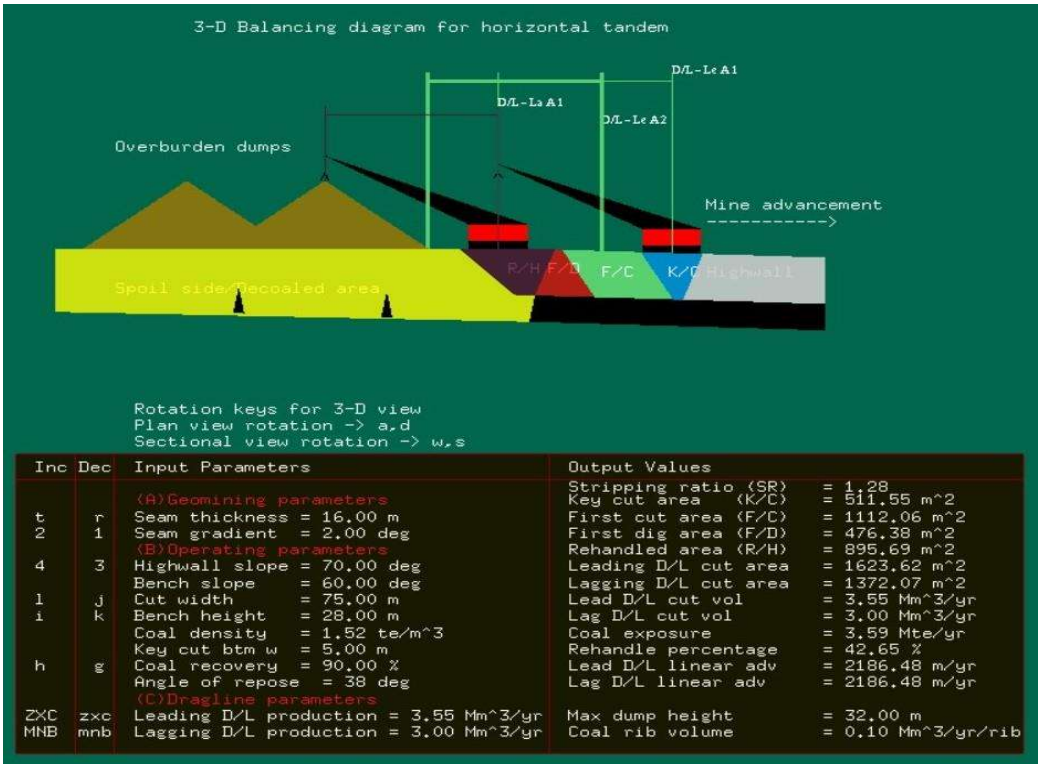

Figure 4.1: Computer generated three-dimensional balancing diagram for Nighai mine.

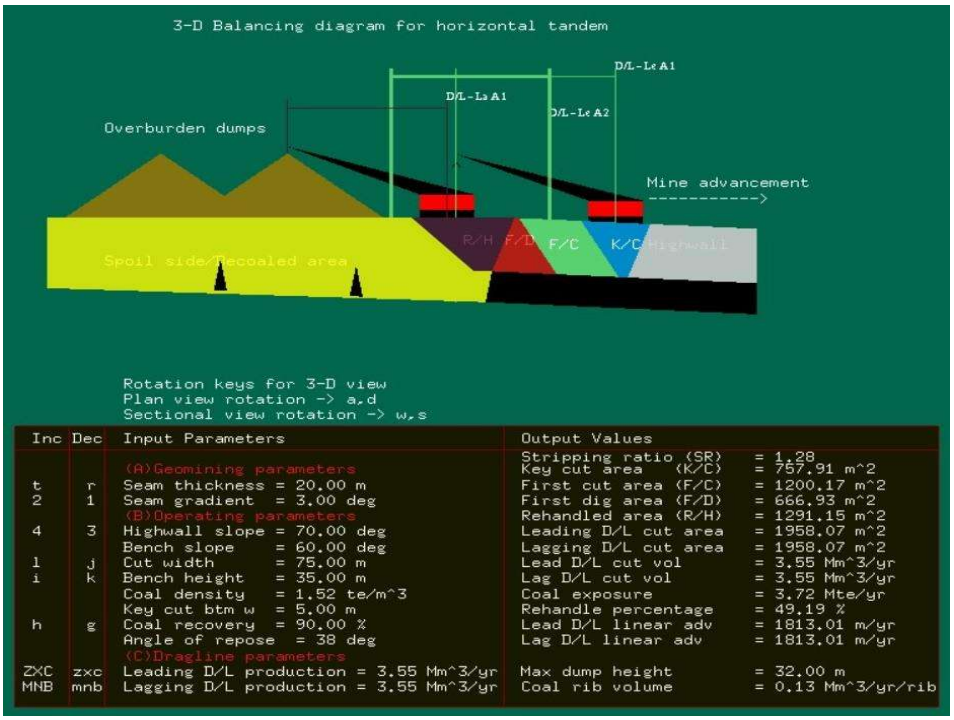

Figure 4.2: Computer generated three-dimensional balancing diagram for Dhudhichua mine.

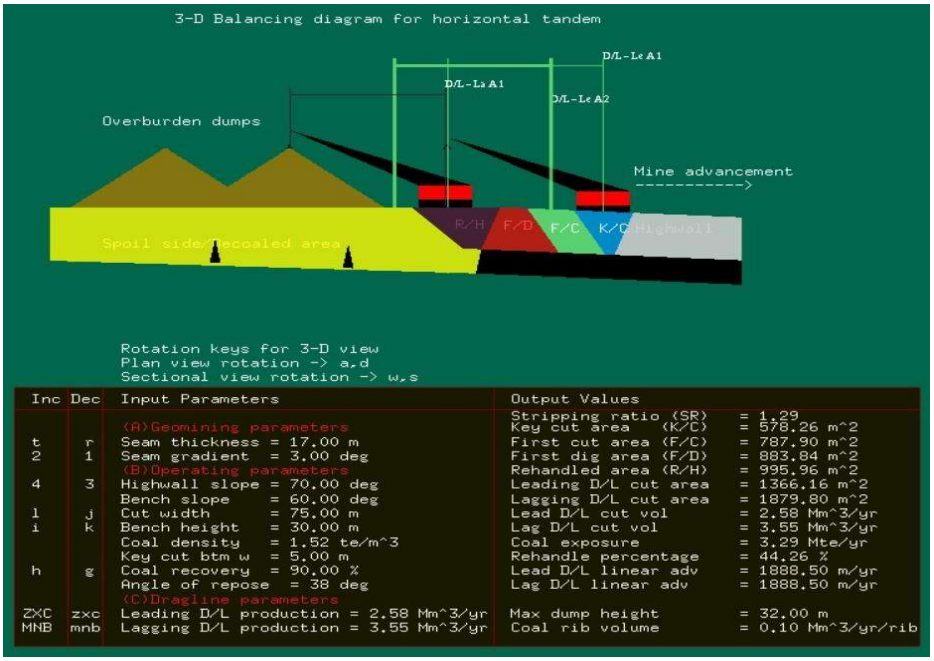

Figure 4.3: Computer generated three-dimensional balancing diagram for Jayant mine.

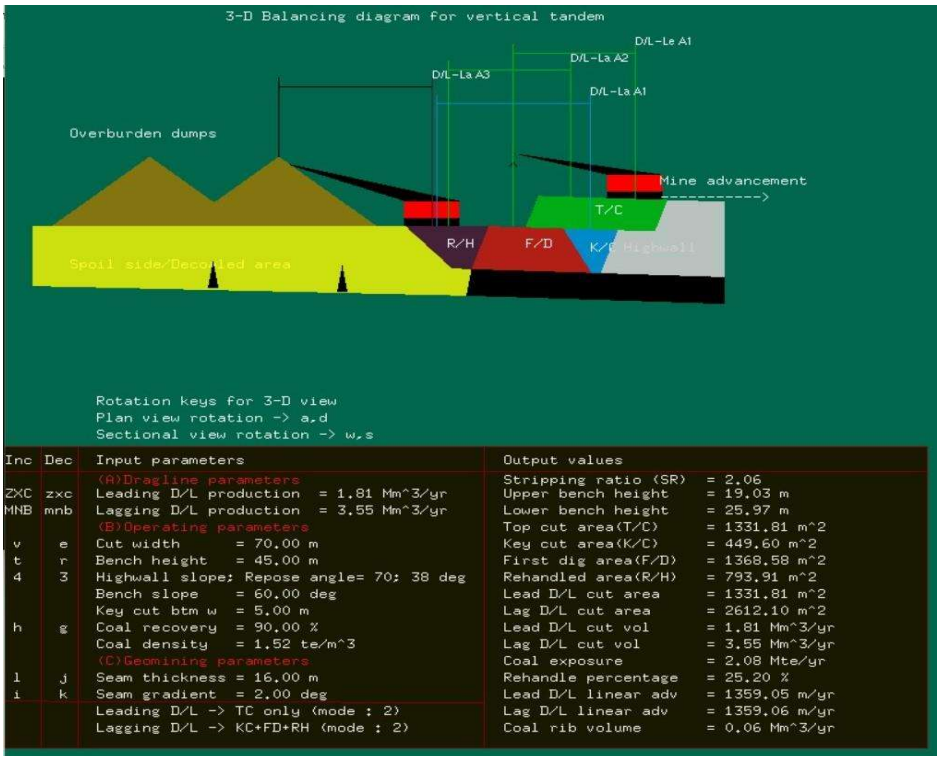

Figure 4.4: Computer generated three-dimensional balancing diagram for Bina mine.

Using figures 4.1 to 4.4, a table has been appended which shows the computer generated three-dimensional balancing diagram data vs actual filed condition data in different mines.

Table 4.1 A comparison of computer generated three-dimensional balancing diagram data vs actual filed condition data in different mines.

S.No.	**Combination (LeD/L+LaD/L)**	**Mode of operation**	**Coal exposure (Mte/ year)**		**% Rehandle**		**Advancement of draglines (m/year)**	
			Field data	**Model predicted data**	**Field data**	**Model predicted data**	**Field data**	**Model predicted data**
1	24/96 + 20/96 (Nighai mine)	Horizontal tandem	3.52	3.59	43.57	42.65	2159	2186.48
2	24/96 + 24/96	Horizontal	3.64	3.72	50.88	49.19	1792	1813.01

	(Dhudhichua mine)	tandem						
3	15/90 + 24/96 (Jayant mine)	Horizontal tandem	3.23	3.29	45.31	44.26	1871	1888.50
4	10/70 + 24/96 (Bina mine)	Vertical tandem	2.01	2.08	26.31	25.20	1341	1359.05

On observing figures 4.1 to 4.4 and table 4.1, it is quite evident that the coal exposure predicted by the developed computer model is significantly high, and the percentage rehandle is low in respect to actual filed conditions in each mine. This significant difference occurs due to the difference in the rehandled area attributable to the non-consideration of dumped spoil below the bench level by the computer graphics method. The dumped material settles due to the sitting of lagging dragline over it, and some compaction occurs due to its own weight. The rate and amount of this settlement could not be ascertained during the field study, due to which the dumped spoil surface is assumed to be level and unsettled in the three-dimensional graphics diagram.

The second important factor which shows the difference in coal exposure is the non-linear (unequal) advancement of leading and lagging draglines in the actual filed conditions (i.e., workload should not be properly distributed in the actual filed conditions). Hence, due to the non-linear advancement of the draglines, an unequal rate of coal exposure occurs in operation, which affects the whole mining operation. Whereas in graphics-based three-dimensional balancing diagram, cross-section areas taken by draglines, coal exposure and linear advancement of the draglines match. From the foregoing discussion, it is quite evident that the graphics-based preparation of the balancing diagram has yielded precise results in terms of rate of coal exposure, percentage rehandle, and linear advancement of the draglines. The accuracy of the

computer-generated three-dimensional balancing diagram was very high. Therefore, this program can be used for further studies

4.2 Applications of the developed model

The developed computer model for the dragline planning may be used for several applications in coal mines. This computer model can be used to plan and monitor the dragline operations for a new mine or for an existing mine that is being expanded.

Some of the major applications of the developed model are as follows-

1. The program can be used to create cross section of the dragline panel, which can be used to evaluate different production scenarios.
2. It helps in deciding the axis of movement along with the seating position of the draglines.
3. It is helpful in calculating the cross-sectional areas and volume of various cut sections of the dragline panel in the mine.
4. It can be used to select the mode of dragline operation.
5. It can be used to find the best combination of dragline height and cut width combination in a particular mode of dragline operation.
6. The computer model also facilitates in optimisation of cut width and overburden bench height taken by the draglines.
7. Bench height distribution (upper and lower bench) in vertical tandem mode can be estimated.