

Development of IT Enabled Vocational Training Framework Based on Regulatory Guidelines for Indian Opencast Coal and Metal Mines

A.K. Sinha¹, U. Bhadra² and A.K. Nath

¹National Geoscience Awardee & Former DDG, DGMS, India. E-mail: ashimkrsinha@gmail.com

²Special Secretary, Govt. of West Bengal & CVO/Director, WBPDC, India.

³Consultant, WBPDC & Former GM, CIL, India

Abstract

Based on National conference on safety recommendations, regulatory guidelines, international best training practices and conducting training needs analysis of fifty-nine selected key category mining personnel from four large opencast coal mines by using copyrighted AK Safe app, an IT enabled vocational training framework (AKCON online training app) has been developed for Indian coal and metal mines. The system has undergone maiden field trial successfully in the Group Vocational Training Centre (GVTC) established to cater the need of six opencast coal mines of West Bengal Power Development Corporation Limited (WBPDC).

Keywords: ILO- International Labour Organisation; DGMS-Directorate General of Mines Safety; CIM- Chief Inspector of Mines; WBPDC-West Bengal Power Development Corporation Limited; MVTR-Mine Vocational Training Rules; CMR- Coal Mines Regulations; MR- Mines Rules; VT- Vocational Training; NCSM- National Council of Safety in Mines; HEMM- Heavy Earth Moving Machinery; IME- Initial Medical Examination; PME-Periodic Medical Examination; VR- Virtual Reality; SMP- Safety Management Plan; KPC- Key Process Control; PHMP- Principal Hazard Management Plan; MDO- Mine Developer & operator; COP- Code of Practice; SOP- Safe Operating Procedure

1.0 Introduction

An introspection to the mine accident and near miss inquest reports revealed that there exists a distinct lack of understanding about the process and procedures of different mining operations, among the mining personnel. It has been envisaged that implementation of a structured training scheme would go a long way in improving the awareness and understanding of workmen/supervisors/managers about different work routines and help in creating a productive and safer work environment in mines.

The importance for imparting structured training and re-training to the officials of mining industry has been emphasised,

amongst others, by the ILO convention no. 155 (Occupational Safety & Health), National Policy on Safety, Health & Environment at Workplace, and National Conferences on Safety in Mines. Accordingly, directions for training the persons employed or to be employed in mines has been included in The Occupational Safety, Health and Working Conditions Code, 2020/Mines Act, 1952; and, express provisions to provide initial, refresher, special and on the job training, etc. has been made under Mine Vocational Training Rules, for industry compliance. Specific training requirements are also laid down in coal mines regulations and mines rules. In consonance with the mining law, Directorate General of Mines Safety (DGMS) has issued a series of guidelines/circulars to facilitate conduct of structured training for workmen employed/ to be employed in the mining industry.

*Author for correspondence

2.0 Statutory Provisions, Safety Conference Recommendations and Regulatory Guidelines

As per the directives contained in the Mines Act, 1952, the Mine Vocational Training Rules, 1966 was notified for industry compliance. Apart from this, various stipulations are made in coal/metal mines regulations and mines rules pertaining to vocational training.

The salient features of the stipulations made under the (a) Coal Mines Regulations, 2017/Metal Mines Regulations, 2019 (Amendment), (b) Mines rules, 1955 and (c) Mine Vocational Training Rules, 1966 are detailed in Table 1.

As regards to vocational training, successive conferences on safety in mines made pioneering recommendations, which were published as DGMS Circulars for adoption by the mining industry. The salient issues covered under the recommendations are detailed in Table 2. Salient features of other DGMS Circulars on vocational training.

DGMS Cir. No. 37/1971

Improvement of standard of vocational training centre and training imparted—During different inspections of Training Centres, it has been observed that the centres lacked in different aspects detailed in the above referred circular.

Improvement of the standard of training centres and of training imparted is very essential for achieving higher safety standard and productivity.

Details of Class-room, Training Gallery/Workshop, Furniture, Equipment, Tools, Fixtures, Supplies at V.T.

Centres—Particulars of class-room, furniture, equipment, tools etc. to be provided at various Training Centres are detailed in the above referred circular.

DGMS Circular No.3 of 2019

Corporate management of mines shall hold structured training programmes on regular basis to sensitize the stakeholders (workmen/supervisors/managers) about their role in formulation and management of Safety Management Plan (SMP).

3.0 Amendment of Mine Vocational Training Rules

Central Government has published the draft Mine Vocational Training Rules in the Gazette of India: extraordinary [G.S.R. 826(E). dated November 6, 2019] with a view to replace the existing Mine Vocational Training Rules, 1966. The salient features of the amendment proposed, are detailed below in Table 3.

4.0 Development of Training Scheme for Opencast Coal and Metal Mines

The training scheme was developed for the Group Vocational Training Centre (GVTC) of WBPDCCL which has been designed to cater the need of six captive coal mining units,

Table 1: Statutory provisions regarding training in mines

Particulars	Salient features of the statutory provisions regarding training
1. Coal Mines Regulations, 2017/Metal Mines Regulations, 2019 (Amendment)	(a) Mine owner(s) to ensure adequate training & re-training programme for workers; (b) Mine contractors shall provide workplace safety & health hazards awareness and training to workers; (c) The support plan for mines shall also include the implementation strategy of the plan, training and inspection and supervision policies; (d) persons, including all operators of plants, machinery and heavy earth moving machineries, shall be trained in the use of fire-extinguishers and in firefighting; (e) Mine dust samples shall be taken by a person who has been specially trained for the purpose; (g) training of all operators on the use of the remote-control device in mines; (h) Training for crane operators; (i) Training for operators of heavy earth moving machinery (HEMM); (j) Training to the response team members under emergency response & evacuation plan (EREP).
2. Mines Rules, 1955	(a) Orientation training for qualified supervisors to act as workmen's inspector; (b) Training of persons in first-aid.
3. Mine Vocational Training Rules, 1966	(a) Initial training for persons to be employed in a mine; (b) Refresher training for persons employed in a mine once in five years; (c) Training of timber mistry and persons handling explosives; (d) Training of persons on shotfiring; (e) Training of other categories of persons to be newly employed in mine, as specified by CIM by a general or special order; (f) Periodic training in gas testing (Once every year for persons holding gas testing certificate, persons eligible to appear at the gas testing certificate examination and also persons who intends to appear at the examination within succeeding three months.

Table 2: Salient recommendations regarding training by conferences on safety in mines

Particulars	Salient recommendations made regarding training
1. Fifth Conference (1980)	(a) Specialised training courses for the development of skilled operation required for heavy earth moving equipment, longwall face equipment etc.; (b) Establishment of Central Training College/ Institute for training Instructors and development of special cadres of mine surveyors and mine overmen/ foremen; (c) comprehensive five-year scheme for training of all supervisory staff and workers; (d) Training programmes to be based on the requirement of trained manpower for future development of mining industry and setting up of a Tripartite mechanism to advise on the modalities and infrastructure for such training.
2. Sixth Conference (1986)	(a) Every worker to undergo appropriate training whenever there is change in his nature of job; (b) Every worker involved in an accident to undergo special and appropriate training before he is re-assigned to work in the mine; (c) Suitable organisation to be in place for training of Workmen's Inspectors and members of Pit Safety Committee to frame and conduct suitable and appropriate training programmes; (d) Mining Companies to clearly identify the need for training of supervisors working in mines.
3. Seventh Conference (1988)	(a) All operators of HEMM to undergo regular checks to test their driving/operating skill, knowledge and health once in every five years. Arrangement to provide comprehensive training to operators to be in place; (b) Suitable training institute/training centre to be in place.
4. Eighth Conference (1993)	(a) Each mining company to draw up model training schedules for different categories of work persons; (b) Existing Training Modules to be updated from time to time; (c) The in-house training staff to be trained by introducing properly designed modules with the assistance of outside faculties, if considered necessary; (d) All front-line supervisory officials like sirdar/Mates Overmen/ Foremen, Surveyors, Electrical/Mechanical Supervisors/Chargemen/foremen as well as persons supervising other surface operations to be imparted structured training in safety management, for at least two weeks, once in every five years, covering about 20% strength every year.
5. Tenth Conference (2007)	(a) Each company to impart structured training to officers, supervisors and support personnel on roof bolting; (b) Training of all employees of Mining Companies to be organized with the help of experts, both national and international, for optimal adoption of safety management system.
6. Eleventh Conference (2013)	(a) All persons deployed by the contractor for working in mine to undergo vocational training; (b) Training of all employees of Mining Companies to be organized with the help of experts, both national and international, for optimal adoption of safety management system; (c) Each mining company to draw up appropriate training schedules and modalities for implementation.
7. Twelfth Conference (2020)	(a) No person to be engaged in any job in a mine unless his skill has been assessed by the management through a well-defined process; (b) Modern gadgets and equipment e.g., training videos, simulators, virtual reality (VR) etc., to be used for skilling and up skilling of existing and newly appointed contractor employees.

with a targeted production of over nineteen million tonnes of coal in 2022-23. The manpower on roll in these coal mines and ancillary unit(s) is more than 3000. With suitable site-specific modifications, the scheme can be extended to other opencast coal and metal mines.

As envisaged in the mine vocational training rules, 2019 (amendment), the training scheme (including modules) comprises a set of industry developed resources that allows skills or competencies to be formally assessed and recognised against industry competence standards, and in line with statutory provisions and guidelines.

4.1 Formulation of Training Scheme

Detailed discussion and deliberations were held with all stakeholders (workmen/supervisors/managers/engineers) and officials of internal safety organisation/training department, to formulate a training scheme, in pursuance with regulatory provisions (existing and proposed) and guidelines.

4.1.1 Assessment of the competency of mining personnel

Provisions of the MVTR, 2019 (Amendment) stipulates, among others, a mechanism for assessing the current

Table 3: Salient features of Mine Vocational Training Rules (Amendment)

Mine Vocational Training Rules (Amendment) published in the Gazette of India: extraordinary [G.S.R. 826(E). dated November 6, 2019]		
Particulars	Contents	
1. Training scheme (New provision)	The owner of every mine shall ensure that a training scheme comprising of theory and practical is prepared and submitted to the Chief Inspector of Mines and Regional Inspector of Mines for persons employed or to be employed in the mine including the persons connected with any work: It shall include (a) initial training for the persons to be employed in the mines and others; (b) refresher training for the persons already employed; (c) training in case of introduction of new technology, equipment or change in work procedure; (d) assessing the current competency of a person employed in the mine and prior learning, in establishing the person's training needs; (e) assessing the training need of persons working in mines for the safe performance of the mining operations; (f) appointing persons who are competent to give training and assessing workers' competency; (g) keeping and auditing records of training; (h) keeping records of assessment given and undertaken by the trainee; (i) the relevant standards, modules or any other guidelines issued in this behalf by the Chief Inspector of Mines from time to time; (j) Course material on various topics for different categories of persons for delivering lectures in vocational training centre.	
2. Board for vocational training (New provision)	For contents refer to G.S.R. 826(E). dated November 6, 2019	
3. Refresher training (Amendment)	Once in four years (CIM may increase or decrease the duration). The persons shall undergo training during normal working hours on full day release system.	
4. Special training (Amendment)	For new technology, equipment and system of work for which training standards are not notified.	
5. Training of persons (New provision)	After long absence or after an accident or change of job Training of persons after long absence or after an accident or change of job.	

competency of a person employed in the mine and prior learning, in establishing the person's training needs. The methodology for assessment of the competency of mining personnel (Pre and post training) for sixteen categories has been developed.

4.1.2 Initial and refresher training

The scheme of Initial and refresher training has been developed, in pursuance of the provisions of MVTR, 1966.

4.1.3 Job training

In pursuance of the provisions of MVTR, 1966 and DGMS guidelines contained in DGMS Cir. Legis-4/75 (Revised), the scheme for basic and refresher job training for fourteen select categories have been developed.

4.1.4 Training needs assessment of work persons for safe mine operation

Assessment was done by filling up of the Audit Information Questionnaire (AIQ) which incorporates a mechanism of mapping the training needs. Fifty-nine key mine officials (workmen/supervisors/managers/engineers) from four

large opencast coal mines participated in the process through AK Safe app [Copyright-Sinha,2022]. The interactive process deployed by AK Safe app is in sync with the concept of system theory, and successfully used for the first time to map the training needs for safe mine operation.

Special training for safe performance of the mining operations: Based on the feedback received from work persons, supervisors, managers/work in-charges and senior mine officials, twelve training schedules for safe performance of the mine operations have been developed.

5.0 Development of AKSCON on-line training application on the basis of VT Scheme Developed for Opencast Coal and Metal Mines

The "AKSCON Online Training application" is proactive and facilitates on line monitoring and management of vocational training scheme with digital data storage and retrieval, in accordance with the provisions of mine vocational training

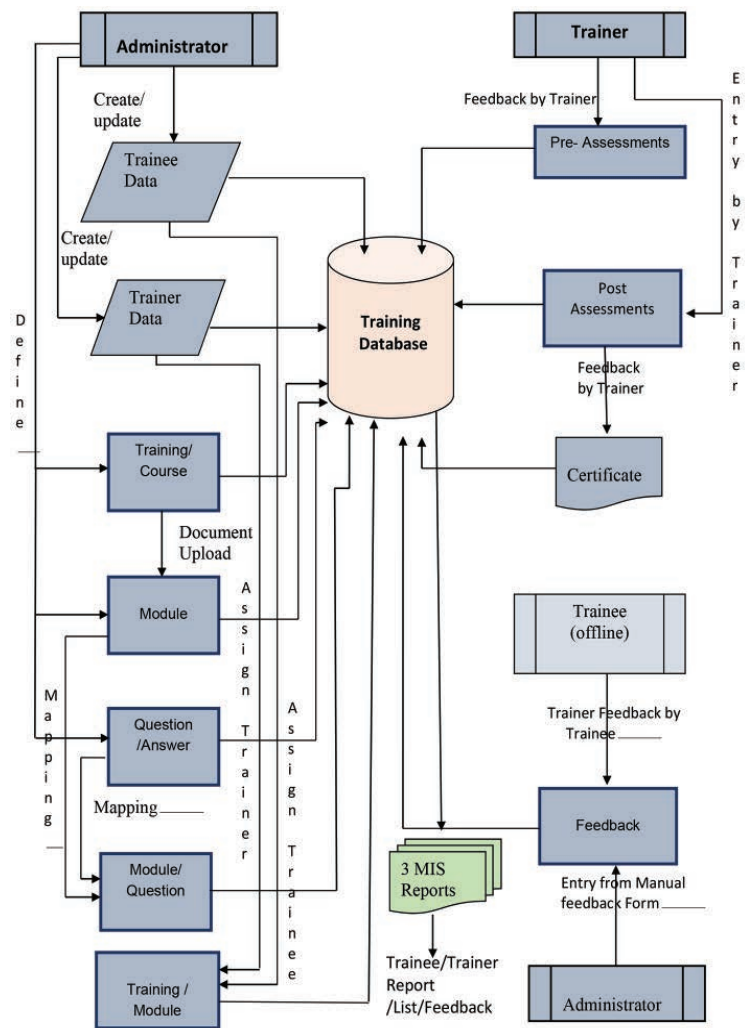


Figure 1: Process flow diagram of AKSCON on-line training application

rules and DGMS guidelines. It is also equipped with useful analytics which assists in taking quality training related decision in time.

The app facilitates capturing training information along with participant (i.e., trainee) and trainer, both internal and external. The application has been developed to capture trainee performance both at theory class and field. Also, based on the performance, there is a provision to issue certificates to the participants. It will also facilitate cloud hosting of developed training modules with course content, time schedules, etc., for seamless access to authorized training personnel. An application has been made for registration of the IT enabled system-AKSCON online training application with copy right office (diary no. 5184/2023-CO/L dated 27th February 2023) which is under consideration.

The process flow diagram of the application is given in Fig.1.

6.0 Concluding remarks

The training scheme incorporating the vocational training modules have been developed, in pursuance with the stipulations of MVTR, 1966/2019 (Amendment), DGMS guidelines, and in alignment with best international training practices for training the mining personnel of six opencast coal mines of WBPDCCL. To make it future ready, a mechanism for assessing the current competency of a person employed in the mine and prior learning, in establishing the person’s training needs and (b) assessment of the training need of persons working in mines for the safe performance of the mining operations has been incorporated, as mandated in the MVTR, 2019 (Amendment).

Site specific modification(s) may be needed in the training scheme, to accommodate different geo-mining locales, mining practices and understanding of mining personnel about workplace safety, to extend its application to other Indian opencast coal and metal mines.

In sync with the doctrine of Digital India, the “AKSCON cloud based on-line training application” is an inclusive instrument for mining enterprises/entities, to fulfill the vocational training needs of coal and metal mines, in alignment of regulatory provisions and guidelines. The system has undergone maiden field trial successfully in the Group Vocational Training Centre (GVTC) established to cater the need of six opencast coal mines of West Bengal Power Development Corporation Limited (WBPDCCL).

7.0 References

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