

1. Introduction

In recent times there have been a number of enquiries of how one goes about becoming a qualified rock engineer. The purpose of this note is to try and answer this question, but also provide some interesting background information on the Chamber of Mines (COM) rock mechanics certificates.

2. History of the certificate

The Chamber of Mines Certificate in Rock Mechanics (COMCRM) was introduced into the South African mining industry in the 1970's by rock mechanic practitioners in an attempt to regulate and standardize rock mechanics practitioner competency. Initially the Rock Mechanics Departments in the various mining houses did their own internal development of what is now known as Rock Mechanic Officers/Practitioners. A shortcoming was identified when these persons wanted to move between mining houses, in that they could not produce an industry-accepted certificate of competency.

Based on this shortcoming, the Group Rock Engineers Committee (one of the sub-committees of the Chamber of Mines) decided to initiate a Rock Mechanics Certificate of Competency. The issuing of the Chamber of Mines' Rock Mechanics Certificate commenced in 1977, with Ken Hattingh being the first person to be awarded this certificate. Initially the certificate was only applicable to hard rock tabular mining, although the soft rock tabular mining option followed a few years later.

Initially, the entire examination was conducted underground - the candidates accompanied the examiners underground and were questioned extensively underground to test their competence. As time progressed, first one, then two, and finally three written papers were introduced in addition to the practical assessment.

The certificate has become a pre-requisite for rock mechanic practitioners to practice in South Africa. In 2002 this was written into law, with Regulation 14.1 (8) of the regulations related to the Mine Health and Safety Act (Act 29 of 2001) stating that:

“At every underground mine where a risk of rock bursts, rock falls or roof falls exists, and at every other mine where a significant risk of rock bursts, rock falls or roof falls exists, the employer must ensure that the input of a competent person is properly and timeously considered and integrated into mine design, planning and operations.”

In chapter 22 of these regulations, the competent person referred to in regulation 14.1(8) is defined as “...a person who is at least in possession of either the Chamber of Mines Certificate in Rock Mechanics [Metalliferous Mines], or the Chamber of Mines Certificate in Rock Mechanics [Coal Mines], whichever is appropriate for the type of mine concerned.”

For many years, Up until May 2007, the certificate only catered for underground tabular mines such as gold, platinum and coal. In May 2007 the syllabus was extensively updated and revised, reference to more recent textbooks were included and the scope of the certificate was expanded to include massive underground and open pit disciplines as specific options.

3. Where do you start?

The 1st step in becoming a qualified rock engineer is to register for, and pass the COM Strata Control Certificate of Competence. This certificate consists of a theory and practical examination. The theory examination is administered by the COM and there are two examinations in a calendar year, towards the end of May and October respectively. The pass mark for the theory paper is 60% and 80% for the practical.

The practical examinations are conducted by the various mining companies and you need to make arrangements with a company if you are not working for a mining company. The practical examination is typically organized within 60 days of the written examination. You can attempt the practical examination without having passed the theory and vice-versa. However, you are only allowed to attempt one practical examination for every theory examination attempted. In order to manage this you need to register on the SANIRE website before you can attempt the SCO practical examination.

Syllabi for both the theory and practical examination are available on the SANIRE website ([Click here](#)). Past papers and model answers are also available on the website to assist candidates with their examination preparation. ([Click here](#))

Rock Engineers come from various backgrounds and at this stage you do not need any qualification to register for the examinations, but a minimum of a Grade 12 with mathematics and science is recommended, due to the nature and complexity of the examinations. The COM will issue you with a COM Strata Control Certificate of Competence once you have successfully completed both parts of the certificate.

4. What is the next step?

The next step is to complete the COM Rock Mechanics Certificate of Competence. This qualification consists of 4 parts, 3 theory papers and a practical examination. Pass mark for all four papers is 60%. Two of the theory papers are common to all mining disciplines and one paper is sub-divided into the four options. The theory papers are:

- Paper 1: Basic Theory
- Paper 2: General
- Paper 3: Applications
 - P 3.1 Hard Rock Tabular (Typical tabular gold and platinum mines)
 - P 3.2 Soft Rock Tabular (Typical tabular coal mines)
 - P 3.3 Massive Mining
 - P3.4 Open Pit Mining

In contrast to the SCO certificate, a candidate must pass all three theory papers before he/she can attempt the practical examination.

There are syllabi, suggested reference textbooks and links to learning material for the various subjects available on the SANIRE website ([SANIRE - South African National Institute of Rock Engineering - Home](#)). Past papers and model answers are also available on the website to assist candidates with their examination preparation. ([Click here](#))

The COM will issue a COM Rock Mechanics Certificate of Competence once you have successfully completed all four parts of the certificate. Your certificate will indicate which mining discipline you are competent in and you will have to pass all the application theory papers (3.1 – 3.4) as well as the practical examinations associated with these if you want to be declared competent for all.

For example: If you passed P1, P2 and P3.1 + the appropriate practical examination, your certificate will reflect only Hard Rock Tabular. If you then want to add soft rock tabular you need to write P3.2 and the relevant practical. Your initial certificate will then be withdrawn and a new certificate issued that will reflect both hard and soft rock tabular.

The examinations are set by the SANIRE examinations committee which consists of experienced rock engineering practitioners. If you want more information regarding the examination committee and the administration of the examinations itself, you can read the “Guidelines to the Rock Mechanics Certificate” which can be found on the website. ([Click here](#))

5. Where to from here?

Once you have passed the COMRMC you can study towards the Advanced Rock Engineering Certificate (COM AREC). This certificate is awarded subject to you having completed 6 courses (4 compulsory subjects, 2 optional subjects) on a post-graduate level at a nominated university (currently Wits University or Pretoria University).

Once you have completed the necessary courses, you request that the university writes a letter of recommendation to the COM, which will issue you with the Advanced Certificate. This certificate is not required by the Mine Health and Safety Act (MHSA) but many companies require this qualification for promotion to the level of rock engineering manager.

You can also opt to study towards a Masters’ degree or Doctorate, specialising in rock engineering, but you will probably require a 1st degree (or other suitable tertiary qualification) to be accepted by a university for post-graduate studies.

6. Career Path

A typical career path for a rock engineer is shown in Table 1 below. The nomenclature used for the different roles change from company to company and between disciplines.

Table 1: Typical career path and associated qualifications

Role	Qualification	Comment
Strata Control Observer	Generally none required but there are MQA accredited courses available	This role is typically the collection of geotechnical data
Strata Control Officer	COM Strata Control Certificate	Will start doing analyses of data and make low level recommendations.
Rock Engineer / Senior Rock Engineer	COM Rock Mechanics Certificate	Higher level of analyses and input into mine design and layouts as well as design of support systems.
Rock Engineering Manager	COM Rock Mechanics Certificate Some companies require the COM Advanced Rock Engineering Certificate. At least 5 years experience as a SRE is required.	High level of technical knowledge as well as managerial skills required for this role as you start managing a rock engineering department on an operation
Principal Rock Engineer/ Manager: Rock Engineering	COM Rock Mechanics Certificate COM Advanced Rock Eng certificate. MSc or MEng is advantageous At least 5 years experience as a REM is required	Provides expert advice on geotechnical interpretations to solve complex technical investigations including probabilistic analysis, and drives improvements in mine safety and efficiency
Manager: Rock Engineering/ Group Rock Engineer	COM rock mechanics certificate Advanced certificate. MSc or MEng degree At least 5 years experience as a PRE is required	Drives the development and application of technical analysis, translating insights from research / global operations and setting strategy for future mines