



Mining Engineering

WHAT DOES A MINING ENGINEER DO?

Mining engineers plan and direct the various engineering aspects of extracting minerals from the earth. They prepare initial plans for the type, size, location and construction of open pit or underground mines.

The sorts of things that a mining engineer oversees at a mine might include:

- conduct investigations of mineral deposits and undertake evaluations in collaboration with geologists, other earth scientists and economists to determine whether the mineral deposits can be mined profitably
- prepare plans for mines, including tunnels and shafts for underground operations, and pits and haulage roads for open-cut operations, using computer-aided design packages
- prepare the layout of the mine development and the way the minerals are to be mined
- plan and coordinate the employment of mining staff and equipment with regard to efficiency, safety and environmental conditions
- consult with geologists and other engineers about the design, selection and provision of machines, facilities and systems for mining, as well as infrastructure such as access roads, water and power supplies
- operate computers to assist with calculations, prepare estimates on the cost of the operation and control expenditure when mines come into production
- oversee the construction of the mine and the installation of plant and equipment
- make sure that mining regulations are observed, including the proper use and care of explosives, and the correct ventilation to allow the removal of dust and gases
- conduct research aimed at improving efficiency and safety in mines
- establish first aid and emergency services facilities at the mines.

MINING ENGINEERING CAREER OPPORTUNITIES?

Mining engineers have a wide variety of career options including becoming mine planners and designers, consultants for tunneling operations (for road, rail, hydro-electric, water supply or sewerage works), operations managers, technical specialists (eg. rock mechanics, drilling and blasting, mine machinery or ventilation), investment analysts and advisers, researchers, or general managers and mine managers.

To prepare for such a career, students studying mining engineering cover a broad range of subjects such as mining technology, rock mechanics, ventilation, geology, metallurgy, surveying, economics and finance, management, health and safety, environmental principles and computer applications.

Mining Engineer - Open Pit

Mining Engineers working in open pits are involved with both long and short term open pit mine planning, mine design scheduling and budgeting, strategic planning, supervision of technical and operating staff, mine management. They are also involved with feasibility studies, drilling and blasting supervision, operation of mining systems, evaluation of open pit mining equipment, mining contract development.

Mining Engineer - Underground

Underground Mining Engineers can be involved with coordinating mining activities, maintenance scheduling for all equipment, short/long term mine planning, scheduling and design. They supervise staff and are involved with feasibility studies, mining contract development, design operation and maintenance of underground mining equipment.

Mining Engineer - Coal

Coal mines can be open pit or underground and tend to use different mining methods. Coal mines can be prone to gas and fire problems. Coal Mining Engineers can be involved with coordinating mining activities, maintenance scheduling for all equipment, short/long term mine planning, scheduling and design. They supervise staff and are involved with feasibility studies, mining contract development, design operation and maintenance of mining equipment.

Mining Engineer - Consulting

Mining Engineers who work as consultants are often involved in a wide variety of projects, mining methods and different technical areas. They use computer programs to model the mining process and design and can work on both open pit and underground developments. Consulting mining engineers will typically be based in coastal cities and fly out to projects and mines as required.

Mining Engineer - Academic/Research

Academic and Research mining engineers often work in universities or CRC's (cooperative research centres). Rather than looking primarily at the economic issues of how to mine most economically and locating the boundaries of ore deposits for this reason, academic and research engineers investigate why and how things behave the way they do or are the way they are. They experiment with different mining methods, designs and equipment.

KATE SOMMERVILLE

MBA, Grad.Dip (Mining), B.Eng (Geological) RMIT, 1st Class Mine Managers Certificate of Competency (WA,Qld), UG Supervisors Certificate of Competency (WA). MAusIMM. Manager Business Improvement - Mine, Olympic Dam, BHP Billiton

What formal qualifications do you have?

After RMIT in Melbourne I did a distance-mining course at Ballarat. I then concentrated on getting my statutory tickets. After a break I realised that I was unbalanced on the business side so I did an MBA - Distance through Edinburgh Business School. I have started learning Spanish and Six Sigma Improvement Methodology.

Why did you choose your particular career(s)?

I put all my likes together: earth science, physics, chemistry, maths, outdoors and adventure. I wanted to do something useful: mining was on the radar by year 11 and in my final year of school we did 'minerals to metals in chemistry' and suddenly from an average student I shot to the top of the class for this subject. I knew it was the industry for me. I picked Geological Engineering I was lucky enough to get a women in engineering cadetship from Melbourne Water after 1st year. I was very grateful for that experience.

What have you done?

I have 13 years experience and have worked all around Australia and also did some work at mines in Sth America, Nth America and Sth Africa. I have done a mix of residential and FIFO arrangements. I started off in underground mines but have been exposed to many types of commodities and operations. Roles include: production, planning: supervision, contracting, foreman, shift bossing and underground operator. For the last two years I worked in a Business Improvement role where I was responsible for networking, running workshops and conferences, benchmarking, educating and encourage sharing of technical expertise over all the BHP Billiton sites in the world. Now I am assisting Olympic Dam improve its mining operations.

Do you have any regrets about how your career has developed?

I finally got the dream job so, in spite of everything and doubts at many points it has worked out. My initial approach was to get broad experience in production, planning, corporate and contract. I thought that if I was solid then I could pick anything and be more robust. I could not say that I planned each job – but I have ended up with some great roles.

I have seen some others who have set out to get a solid technical portfolio and ended up in consulting by 30 – I admire their foresight. I have changed companies and sites quite a bit – it can get frustrating changing so much – you have to keep proving yourself each time.

What have you enjoyed most about your profession(s)?

Mining has such a cross section of people and I enjoy seeing different perspectives. People spend years in 'wanderlust' trying to get the people/country experience that you can get in mining. The people are passionate, friendly, encouraging and like me, enjoy a good drop of red wine!

What are the negatives and low points in your career?

On my first day of work – part of the operation was closed down and many people lost their jobs. From this day I have always ensured that I never commit too much financially – as there is a chance I may loose my job. The past decade has been tough in mining – and I am seeing for the first time what it is like to be in boom time. Mining is a lifestyle job and my husband is in mining also. It takes quite a bit of juggling to ensure we end up in the same location and roster. It would be good if more mines could accommodate senior professional couples on the same site. I am encouraged to see more women balancing a rewarding career and family at mines – but still think we have a long way to go.

For someone considering a career in your profession are there any words of wisdom to pass on to them?

Get site and hands on experience before you do anything else. Get exposure to both production and planning. Work out where and how you want to live and get experience, which suits your end game. Always leave a job in a better state than you found it - work is about giving and receiving. There is always a win-win solution out there for work issues or your career – the fun bit is finding that solution – it feels good when both parties win. Keep learning, laughing and be positive.

RICHARD PRICE

B Eng (Mining, Hons) B Com (Marketing & Management) MAusIMM
Business Improvement Coach, BHP Billiton

Why did you choose your particular career?

I wanted to spend a few years doing something fun before going into a commercially focused role, and being a mining engineer is great fun.

My current role is wonderful mix of analysis, people skills and team work.

What have you done?

Upon leaving high school I went to Kalgoorlie to study mining engineering. I worked during the holiday break in July of my first year – and every holiday break after that. I spent one year of my mining degree overseas in the USA on a study exchange program. Whilst in the USA I participated in the International Mining Competition and then started the first Mining Team at WASM. Also during my time at University I ran my own company in the IT industry, and served in leadership positions for the student chapter of the AusIMM as well as University related committees. I was awarded the Atlas Copco traveling scholarship for my efforts, and spent several weeks in Europe as a guest of Atlas Copco touring their facilities and mining operations.

Upon graduation I worked in some mines, then worked for a mining equipment company, then in marketing for a IT consulting business and now in Business Improvement for the world's largest mining company.

Do you have any regrets about how your career has developed?

Not at all. The mining industry is a fantastic can-do place to work, and I love it.

What have you enjoyed most about your profession?

I have really enjoyed playing with big trucks and blowing stuff up - all with a safety focus of course! You get paid heaps of money, and in my current role in business improvement I do less technical work and more people work, which I am happy with at this stage of my career.

What are the negatives and low points in your career?

Sometimes in a large organisation you can feel as though you are not making a difference, this happens in all walks of life but come through that by staying focused.

For someone considering a career in your profession are there any words of wisdom to pass onto them?

Get some work over any vacation period (even in first semester of first year of University) to give you a clear understanding of the industry. There are always companies looking for vacation students. Also, figure out where you want to go, then make the best of resources available to you (the AusIMM, professional mentors, University lecturers, books) to get where you want to go.

**PETER CUNNINGHAM**

BE mining (Honours), Member AusIMM
Principal Mining Engineer, AMC Consultants

What formal qualifications do you have?

I completed a six-year part-time mining engineering degree at the WS & LB Robinson College (part of the University of NSW) in Broken Hill, graduating with Honours in 1983. After completing my degree and gaining the necessary operational experience, I then sat for and obtained my NSW Below Ground Mine Managers Certificate.

Why did you choose your particular career(s)?

I grew up in a mining town, where the mining companies offered cadetships, which allowed you to study part-time whilst working full-time at the mine, gaining valuable hands-on experience in your chosen field of study. The prospect of getting paid what was considered a good wage, whilst completing my university studies was very appealing. The first thing I had to do when I was offered a mining engineering cadetship, was find out just what a mining engineer did. Even though I grew up in a town steeped in mining history, I had no idea what role a mining engineer played in it all.

What have you done?

After completing my studies, I spent the next 13 years working in both technical and production roles at the operating mines in Broken Hill. I then moved to Melbourne and worked in a head office/corporate environment for a couple of years, gaining an appreciation of the functions/departments outside of mining, that were part of an integrated mining and smelting company. I was then offered an opportunity to move to Perth as part of a technical services group, whose role was to provide support to the mines operated by that company. This role became redundant after about 1 year following a restructure. At this time I took up an opportunity to join a major mining consultant group.

Do you have any regrets about how your career has developed?

There have been short periods during my career when I have wondered just where I was heading, however, looking back, I feel that my time in Broken Hill gave me some of the broadest operational training you could hope to get, as a mining engineer. In Melbourne I gained an insight into how the corporate side ticked, then moving to Perth in both in-house and external consulting roles I have had the opportunity to grow and apply the knowledge I had gained in my previous positions.

What have you enjoyed most about your Profession?

In my current role as a mining consultant I do work for many different mining companies, both throughout Australia and overseas, which allows me to visit many mine sites and meet with a lot of interesting people, as well as bumping into many old colleagues.

SARAH WILLIAMS

BE (Mining), University of Wollongong
Graduate Mining Engineer – Rio Tinto Coal Australia

Why did you choose your particular career?

In high school I always enjoyed maths, science and any type of problem solving; which lead me to engineering. I picked mining engineering for a couple of reasons:

- I'm an environmentalist and I felt I could do more to help the environment working for mining companies instead of against them;
- I love big machinery and dirt;
- I hated the idea of being stuck in a big office with no contact to the real world. In my job I'm always out on the dragline seeing how things get done and talking to the operators, learning from their hands on experience. It's great to see the designs I create being put into place and getting positive feedback from the operators; and
- I wanted a challenging workplace where I would always be learning from those around me.

What have you done so far in your career?

Before starting as a graduate at Tarong I worked at two other sites as a work experience student. One was a small quarry and the other was a brand new coal mine in the Hunter Valley. At Tarong I have been given the opportunity to spend some time in lots of different roles. When I first started I drove a rear dump truck on shift with the operators. After 6 months driving a truck, I moved into a role in surveying. I spent 4 months working with the surveyors learning their role before I moved into reporting, project design work and truck and shovel design work. And about 7 months ago I moved into my current role of dragline engineer.

What have you enjoyed most about your profession?

Solving problems, seeing my designs being used, the fun but challenging atmosphere of the mine site and meeting great people.

For someone considering a career in your profession, are there any words of wisdom to pass on to them?

Listen to everyone. Everyone has a story you can learn something from - the operators, your co-workers and your bosses.

JOHN NAJOR

BE (Mining Engineering) UNSW, GAusIMM
Graduate Mining Engineer – Pilbara Iron

Why did you choose your particular career?

I recognised Australia was rich in mineral resources with plenty of opportunities for mining professionals. I also knew a lot of people in the industry who had great jobs and really enjoyed their work.

What have you done so far in your career?

During uni I was fortunate to work at the end of every year at a different operation. At the end of 1st year, I worked for Wambo Coal at Singleton NSW, gaining valuable experience in open cut coal mining. In 2nd year I worked for Centennial Coal at their Springvale & Angus Place operations at Lithgow NSW where I was exposed to underground coal mining. And in 3rd year I worked for Pilbara Iron at Tom Price WA, at an open cut iron ore mine.

When I finished uni, I was fortunate to be able to come back to Tom Price as a graduate where I am currently working as part of the Production Planning team, responsible for mine planning across several of Pilbara Iron's mines in the northwest of WA. I am currently working as an engineer but look forward to getting some pit experience driving a haul truck and on the blast crew later in the year.

What have you enjoyed most about your profession?

The people you meet are great right across the board - whether it is an operator on the hill or the mine manager. It's also been great living in a remote town in the Pilbara being part of many community activities and sporting events. I have also enjoyed the opportunities and responsibilities that arise at work.

For someone considering a career in your profession, are there any words of wisdom to pass on to them?

Enrol in the course, work hard and look forward to an exciting career!

CLINT JENKINS

BEngSc (Mining Engineering), GAusIMM
Graduate Mining Engineer – Rio Tinto Hunter
Valley Operations

I completed my studies at the University of Ballarat, Victoria in 2004 under the new three year Bachelor of Engineering/Science degree which was the first time it had been adopted by an Australian University. It was designed to meet the needs of the Australian mining industry – get trained professionals into the workforce fast! It gave me the key understandings of the mining industry in a theoretical and practical environment.

Why did you choose your career?

The main factor contributing to my decision to enter the mining industry was the fact that my father has always been a desk-bound accountant and I decided at an early age that I wanted something a bit more “interesting”, with more options - no offence to accountants! Trawling through career papers, I discovered mining and I set that as my goal.

What have you done so far in your career?

So far throughout my graduate program, I have experienced a number of interesting and worthwhile roles ranging from planning engineer to shotfirer and truck operator. I have had a good balance between office based and in-pit based jobs which is a great help when communicating with others. The best part of being on a graduate program is the exposure to a number of roles and training courses which gives you the necessary tools to go forward in the industry.

What have you enjoyed most about your profession?

Perhaps the most enjoyable aspect of my profession is seeing a job completed on time with no safety issues and knowing that I had been a part of it.

For someone considering a career in your profession, are there any words of wisdom to pass on to them?

Coming from a small country town in Victoria I had never experienced the mining industry, nor had anyone I knew. For anyone in a similar situation, I would strongly recommend getting as much information as you can and giving it a go ... It is a big world out there and it needs mining professionals

GRAEME FULTON

BSc. (Hons) Mining & Petroleum Engineering,
MAusIMM, Mining Engineering Consultant
- Terra Mining Consultants Ltd.

What formal qualifications do you have?

After completing a pre-university year with Anglo-American in South Africa, as part of their scholarship programme, I returned to Scotland to complete my degree at the University of Strathclyde, with a few vacation employment stints along the way.

Why did you choose your particular career?

I have always been interested in the Earth Sciences and coupled with a careers assessment that fitted me into the engineering category I looked at mining engineering. This coupled with the opportunity of a scholarship and pre-university year overseas with Anglo-American set me on the road.

What have you done?

Since graduation I have worked for French-Kier on their Benbain Opencast coal mine (UK); Anglo American Corporation at Vaal Reefs Gold Mine, Premier Diamond Mine and Springbok Colliery; and as Senior Mining Engineer for Avgold on the development of a new deep-level gold mine, Target (South Africa). I also spent part of my career in the mining information systems field, having worked at Andersen Consulting, Intertech Systems and Datamine on mining, petroleum and manufacturing projects, as well as mining software development, training and support, GIS and mapping. I am, and have been, involved in number of mining and quarrying consultancy projects over a wide range of minerals and deposits both locally (New Zealand) and internationally (Southern Africa, Papua New Guinea, Canada and Malaysia).

Do you have any regrets about how your career has developed?

None, I have had many varied and diverse experiences, some good and some not so pleasant, all building up to the fulfilling work I currently undertake.

What have you enjoyed most about your profession?

Like minded people, experiences few people encounter, and many interesting challenges.

For someone considering a career in your profession are there any words of wisdom to pass on to them?

The profession offers many challenges, varying career opportunities in many parts of the world. Mining engineers are few and far between and are always in demand. Put your heart into it and you will get a lot out.

