MINTEK’S SMALL-SCALE MINING AND BENEFICIATION (SSMB) DIVISION is a diverse division of multi-skilled professionals who address issues relating to Artisanal and Small-Scale Miners (ASSMs).

Areas covered are:
- Some of the recent and current projects that SSMB has been involved in are summarised below:
  - Extractive technologies in mining for small-scale mining and related sectors;
  - Beneficiation of resources;
  - Techniques to ensure that ASSM’s operate more efficiently and economically to ensure sustainability;
  - Methods to improve the informal and environmentally unsafe practices that frequently prevail in this sector;
  - Training and skills development; and,
  - Marketing of products.

SSMB’s beneficiaries include existing small-scale mining operators, aspirant small-scale miners and crafters that use mineral and metallurgical resources as a raw material. SSMB provides support to SMME’s by conducting test work towards feasibility studies and access to appropriate technologies.

Ceramics
SSMB has been involved for several years with the development of the rural pottery and ceramics sector in South Africa. These developments include activities of the ceramics laboratory on the Mintek campus and field research with traditional potters around the country. The laboratory maintains a clay database, which looks at properties of clay from various deposits around the country, which are matched with identified poverty nodes for possible sustainable livelihood interventions.

Field research has been done with traditional potters in the Limpopo, Kwa-Zulu Natal and Eastern Cape Provinces, and a detailed commercialisation model was developed. This was piloted with a group of traditional potters in Mapuve Village near Giyani in Limpopo Province. A simple pottery kiln that uses grass and sticks for fuel was designed and installed for the potters at Mapuve Village. This kiln allows them to fire pottery even in wet and windy conditions. The potters have also been assisted in locating markets for their products.

SSMB assists in the setting up of ceramic (pottery) SMMEs and production facilities. This will include facilitating access to funding for the production facilities, training and incubation of the beneficiary entities.

iGoli
The iGoli mercury-free gold extraction process was designed especially for use by small-scale gold miners. Mercury pollutes the waterways and plant life, and slowly poisons people who use it or even just live nearby. A small plant has been designed, which makes the process easy to operate.

This technology has been transferred to miners in Tanzania, the DRC, Mozambique, Peru and other places, and plants have been installed in Gauteng (South Africa) as well as in Tanzania. Research is ongoing to ensure that the waste products from each operation are benign. Upstream processing equipment has also been designed and developed to assist the miners in processing their raw material in preparation for feeding to the iGoli process. This equipment includes a vibrating strake, and a manual centrifugal separator, which is currently under construction.

Beads
Historically, ancient African beadwork was done with precious metals such as copper and gold, ostrich shell, seashells, glass and ceramic beads. This practice died away with the introduction of cheap imported glass and plastic beads from Europe. There is a potential market for ethnic looking hand made glass beads, particularly in the thriving African jewellery and rural crafts industry. Almost all the beads used in the industry at present are imported and in an attempt to create jobs, Mintek developed a technology for manufacturing beads with an African look about them from recycled glass bottles.
Two types of beads are made: opaque beads with an ethnic look to them are made from recycled glass bottles that have been pulverised, and transparent beads are made by melting bits of waste glass in a gas flame.

SSMB have set up several bead-making units in various parts of South Africa. Most of these small businesses are making and selling finished jewellery as well as the loose beads.

**Kgabane Jewellery Programme**

The Kgabane Jewellery Programme is mandated to champion the development of the indigenous precious metal jewellery sub-sector through fusing ancient indigenous craft techniques and goldsmithing techniques to create a product with a uniquely African signature.

Established in 2001, Kgabane has a number of programmes, principal among which is the National Rural Development Programme, which drives Small and Micro Enterprises (SME) in order to meet the development of:

- Creating sustainable livelihoods in rural and poor urban communities;
- Inclusion of historically marginalised groupings, i.e. rural women, unemployed youth and the disabled, into the mainstream jewellery manufacturing industry; and,
- Contributing to job creation and poverty alleviation through the generation of sustainable incomes.

Kgabane has trained over 400 people in nationally accredited skills programmes to date.

Small businesses have been set up nation-wide and provided with comprehensive support that includes production monitoring, quality assurance, design input, basic business skills and facilitation of access to markets.

These enterprises are mainly in rural and peri-urban communities.

**Soil ameliorant**

Many small-scale farmers are unable to afford the high cost of fertiliser, mainly due to the expense involved in transporting it. In nature, many basic igneous rocks contain the trace elements and minerals that are beneficial to plant growth. Mintek examines the rocks found in different areas, and if they are suitable, assists the local people to set up small processing plants.

In another form of soil ameliorant called Biomin, various minerals and organic waste products are tested to identify their suitability for use in the fertilisation of plants. Once a suitable recipe is found, the local communities are helped to set up small processing plants and farmers are advised on the use of the product. This type of material has also been used to fertilise waste dumps, such as those from asbestos mining, that are being rehabilitated.

**Brick Making**

Mintek is involved in a number of projects to assist small-scale operators to manufacture both clay and concrete bricks. In one case, concrete bricks for housing were made from waste slag located at a smelter. Waste from clay deposits is also used to manufacture baked clay bricks. Small-scale brick makers have been assisted in nine different areas, and in one case a concrete block-making machine was loaned to an entrepreneur until he was operating successfully and able to pay back the cost of the machine.

**Dimension stone**

Most of the larger companies that mine stone, such as granite, sell it in large blocks and discard all the smaller pieces and those with cracks and blemishes in them. In fact, they generally reject as waste 80 to 90 per cent of the rock that is mined. Mintek SSMB has assisted groups of women to make use of this waste granite by beneficiating it into saleable products such as cutting boards, headstones, cobblestones and curbstones.

**Coal**

Mintek is also involved in the process for briquetting coal fines into briquettes for domestic use, using a manual low pressure press. Research is ongoing, especially in efforts to reduce the emission of greenhouse gases.

**Training**

A programme has been established for training ASSMs under the auspices of the Mining Qualifications Authority (SETA). Over 2 500 people have been trained under this programme in subjects including geology, legal and regulatory requirements, beneficiation, safety and health, business skills and environmental responsibility. Training courses on minerals such as gold, diamonds and dimension stone are held in the areas where the trainees come from, as well as at the Mintek campus.

The main aim of the school is to assist ASSMs to operate more efficiently and effectively to enable them to be economically viable and self sustaining.

- We offer skills programmes, learnerships and national certificates in small-scale mining;
- Our learning programmes are NQF aligned and as a result, allow progression from NQF level 1 to 4;
- Our training allows portability of credits to NQF level 5 in Mining, Metallurgy and Engineering;
- We use highly trained facilitators, assessors and moderators; and,
- We are endorsed by the Department of Labour as an Employment Skills Development Agency (ESDA).