The Mining Value Chain
Technologies and services developed by Mintek

1. Exploration
   - Geochemical sample analysis;
   - Mineral/ore characterisation;
   - Certified Reference Materials; and,
   - Artisanal and small-scale mining (ASSM).

2. Mining
   - ASSM technology;
   - ASSM training assistance; and,
   - Mining inputs economic studies.

3. Concentration
   a. Comminution/Flotation
      - Flowsheet design and optimisation, and piloting;
      - Plant audits;
      - Ultrafine milling; and,
      - Control and optimisation strategies.
   b. Physical separation
      - Bulk sample preparation;
      - Gravity, magnetic, electrostatic and dense-media separation; and,
      - Pneumatic jigging, and Mineral Density Separation.

4. Pyrometallurgy
   - Pelletisation and briquetting;
   - Pre-heating and pre-reduction;
   - DC arc process development and piloting;
   - Modelling and simulation;
   - Submerged-arc furnace (SAF) control strategy;
   - Fluidised bed and condenser technologies;
   - Refractories performance investigations;
   - High-temperature solid state and phase equilibrium investigations; and,
   - Ore, slag, matte and alloy characterisation.

5. Hydrometallurgy and Biotechnology
   - Atmospheric and pressure leaching;
   - Bioleaching (refractory gold and base metals);
   - Solvent extraction and ion exchange;
   - Electrowinning;
   - Process simulation;
   - Reagent development and evaluation;
   - Gold recovery by CIP/RIP;
   - Activated carbon regeneration;
   - Uranium processing expertise, and U₃O₈ recovery;
   - Cyanide measurement, monitoring and auditing; and,
   - Leach circuit control.

6. Refining
   - Gold refining and value-added products/chemicals;
   - Pyrometallurgical refining of zinc (PWG to SHG), and off-grade ferro-alloy fines; and,
   - Titanium chlorination technology.

7. Value addition
   - New industrial applications for gold: Catalysis; Biomedical; and Nanotechnology;
   - “Smart” materials and sensors;
   - PGM-based superalloys;
   - Low-nickel stainless alloys;
   - Jewellery fabrication;
   - Gold and platinum jewellery alloys; and,
   - Identification of downstream, metals-based, economic development opportunities.

8. General
   - Ore characterisation, analytical and process mineralogy;
   - Certified Reference Materials;
   - Materials characterisation, testing and development;
   - Engineering design, manufacturing, installation and commissioning;
   - Project management services; and,
   - Regional minerals-based studies.