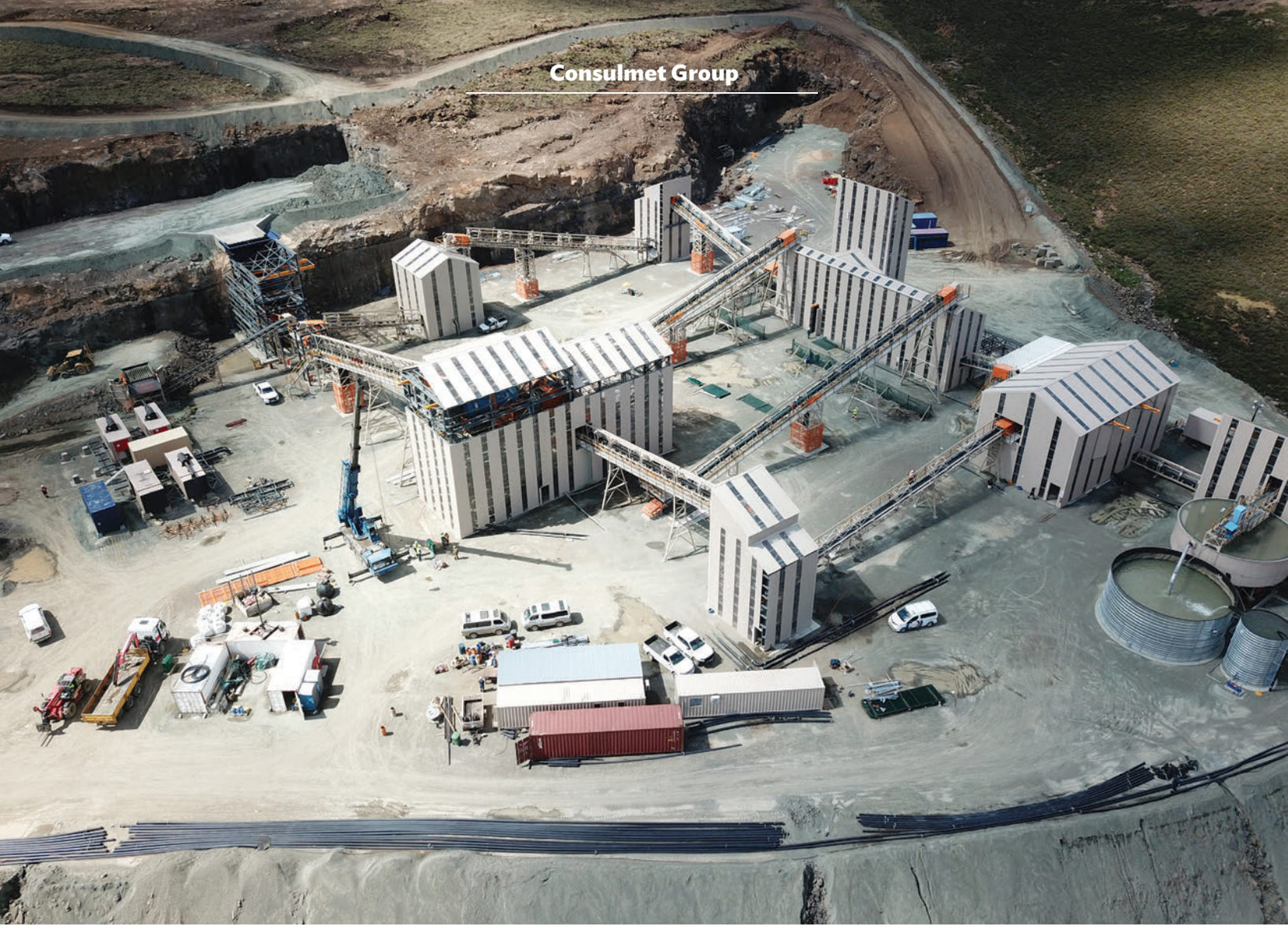

The Consulmet Group
from diamonds to coal to platinum, & technology in between

Consulmet, a process engineering house specialising in modular plants and renowned for its diamond expertise, has grown over the years into a process house with engineering expertise across a variety of commodities, metals and minerals. Its use of current and modern technologies across all its areas of speciality has further enabled it to shine in the market.

"To best reflect its core strengths across its various fields, the Group has been divided into three main elements: Consulmet Minerals, Consulmet Metals and Consulmet Consulting," says Consulmet Group CEO Derek Lahee.

Consulmet Minerals specialises in lumpsum turnkey (LSTK) minerals projects as well as all gravity modular plants. Consulmet Metals' focus is on LSTK metals projects, and Consulmet Consulting is an EPCM entity which focuses on EPCM contracts for the larger blue-chip clients.

In addition, the three entities have a combined operating entity (Consulmet Operations – which designs, installs and operates minerals or metals projects for its clients), as well as an Infrastructure division with capabilities across all civil and electrical projects.

The operating entity has grown following client requests

Above: Mothae diamond mine, December 2018

over the years, and today is currently involved with operating contracts in five different African countries. The infrastructure division has grown organically from the various process plants installed around Africa, where clients have requested a LSTK solution. This division is now involved with several bespoke civil and electrical contracts.

The Group shares an unparalleled 3D drawing office and mechanical design capability, and a major fabrication facility (Consulmet Construction) in Klerksdorp, capable of processing 400 t of steel per month.

To emphasise the three main entities' capabilities, Consulmet highlights several projects executed by each entity over the past two or three years.

Consulmet Minerals

Consulmet Minerals has executed a significant portion of small to mid-tier diamond projects over the last 14 years but has also diversified into coal, phosphates, lithium, fluorspar and heavy minerals. "As the gravity experts within the Consulmet Group we are significantly involved with various iron ore projects, and our expertise in ultra-high density DMS plants and ultra-fine DMS processing is of an advanced nature," says Lahee.

1. Coal spiral plant:
Completed November 2018
Our approach, which is in line with our mission is always to respond to our clients' needs through delivering our value proposition of "Scalability, Availability and Reliability".

One such example of this is our project in Delmas, Mpumalanga. Consulmet supplied two 40 tph spiral plant modules to the client. This was made possible by our team of highly experienced engineers who successfully completed the project in three months from fabrication to site installation.

The plant was handed over to operations after two weeks of treating fine coal to produce a high-quality saleable product. This scope was a Brownfields project that required the installation of equipment due for replacement and the construction and tie-in of the new modules to the existing DMS plant. It included the complete installation of civils, structures and process equipment with the associated electrical, control and instrumentation infrastructure during a 10-day plant shut period. Our team was able to deliver an outstanding output that is synonymous with Consulmet work. We pride ourselves on our high-quality output through high performing engineers with expert skill who continuously deliver every time.

2. Mothae 150 tph kimberlite processing plant:
Commissioned November 2018
The project was completed in 12 months as a full LSTK project with design and supply, all civil supply and installation, and mechanical and electrical installation. The plant includes a large diamond recovery circuit, and X-ray transmission technology is used extensively. Consulmet will be assisting client Lucapa Diamond Corporation with the operation of the XRT modules.

3. Refurbishment of an existing kimberlite operation, utilising alternative technologies:
February 2018
The previous operation had significant clay issues, and Consulmet installed a log washer as a secondary scrubber and replaced the coarse DMS with an XRT. The log washer had an additional benefit in elutriating the gravel ahead of the XRT. In addition, a new design of VSI crusher was used successfully in the tertiary crushing application.

Consulmet Metals

Consulmet Metals specialises in complete LSTK metals processing plants and has now completed 2-off PGM concentrators in the

past five years on the back of extensive hydrometallurgical process capabilities.

1. Jubilee processing plant at Hernic Ferrochrome:
8 5tph tailing treatment plan
In 2016/2017 Consulmet Metals executed a LSTK project for Jubilee Metals Group.

Jubilee Platinum signed a contract with Hernic Ferrochrome for a chromite and PGM beneficiation plant treating historic tailings and current arisings material derived from the existing operation. Jubilee approached Consulmet Metals to deliver a LSTK solution for the execution phase of the Hernic Tailings Treatment Project.

Consulmet Metals developed a process flow sheet and associated detailed engineering for recovering chromite and PGMs from the Hernic Ferrochrome site existing tailings and current arisings material. The existing tailings material is hydraulically mined and pumped to the new beneficiation plant.

The current arisings and hydraulically mined feed streams report to the new chromite and PGMs recovering plant's main feed tank. The plant contains a classification circuit in order to prepare the following streams:

- De-slimed material reporting to the float feed thickener
- Middlings fraction reporting to the fine chromite spirals circuit

The fine chromite spiral module consists of four stages. A metallurgical grade chromite is produced as final spiral plant product.

The spiral plant tailings material is the feed to the flotation plant for PGM recovery. Here various stages of flotation are applied for maximum recovery.

The final PGM concentrate is stored and dispatched periodically from the site storage facility. Consulmet Metals provided a turnkey solution pertaining to all utilities and reagents associated with PGM flotation plants.

The tailings derived from the beneficiation plant reports to the existing tailings storage facility (TSF) ring main.

We estimated a total of 50 weeks for execution of this project at a lump sum price. In conjunction with Jubilee, we selected the long lead item equipment for this project. All additional orders were placed, and the project was completed within the allowed time frame and budget.

2. SMBS (Sodium metabisulfite) dosing plant: DRC 2018
The project was supplied ex-works RSA, on schedule and on budget. SMBS is required for the recovery of cobalt which is a by-product of copper extraction processes. Due to the nature of the chemical, all equipment is stainless steel (316).

The SMBS is mixed in batches and then transferred to a storage tank where it is continuously dosed, at ±14 % (by mass), to a cobalt leaching process. The reagent make-up takes four to six hours and is then transferred to the storage tank.

The SMBS powder is loaded directly into the make-up tank using a feed chute. Two SMBS bulk bags are lifted simultaneously using two electric hoists and are lowered onto bag breakers. The hoists are sized to lift 2 t each.

The SMBS powder then passes through a 316 SS grating screen to prevent the ingress of large particles or foreign objects. A dust extraction unit is used for the containment of possible dust generated, while bulk bag unloading is in process or if sulphurous odours are released when reacting with water during the make-up phase. Extraction

> To best reflect its core strengths across its various fields, the Group has been divided into three main elements: Consulmet Minerals, Consulmet Metals and Consulmet Consulting,
>
> DEREK LAHEE

fans on the housing structure and on the make-up tank have also been allowed for.

The make-up tank is fitted with an agitator for adequate mixing. The SMBS solution is pumped to a storage tank once the make-up tank is full or when required. The SMBS solution is then distributed to the required process destination/s. The solution is pumped by means of dedicated and standby, variable speed drive and centrifugal pump sets, for the transfer and for dosing the SMBS. The reagent plant tanks are covered for dust and fume protection.

Consulmet Consulting

Feasibility studies, design and execution on various contracting models as follows:

1. Copper circuit debottlenecking feasibility study
2. Fire system upgrade design
3. EPC and commission Northam Platinum copper leach autoclave (LSTK project)
4. Number of projects within the electrowinning environment for commodities copper, nickel, cobalt and zinc. Some of these were breakthrough projects with first world technology
5. Various unit process upgrades of filter presses, thickeners, flocculant plants, heat exchangers, tanks and pumping systems
6. Control and instrumentation migration design and upgrade in a current operating plant:
7. Engineering design, construction management and commissioning of new motor control centres in an operating Brownfields environment.

Experience on autoclaves

Consulmet Consulting has proven experience in terms of autoclave design, rebuilds and autoclave linings/brick linings from various installers in the world. Ancillary equipment surrounds a successful autoclave installation. A new SAF2205 autoclave has been designed, built and installed with all ancillary equipment. This has been inclusive on all Civils, SMPP and the E&I disciplines, which included design, fabrication and installation, all undertaken in-house, apart from the autoclave fabrication which was completed by a company external to the group.

High level experience on pressure leach projects

Northam Platinum approached Consulmet Consulting to undertake a study which included the design, supply and installation of a new autoclave within the company's existing circuit. This was a Brownfields expansion project and had to be tied in with existing equipment and processing plant while incurring minimal downtime.

The scope of work included design, supply and installation of the following:

- Autoclave;
- Civil and structural steel;
- Agitators;
- Instrumentation and electrical;
- Piping and valves to enable rapid change-over from the existing autoclave to the new one.

Northam Platinum operates a copper pressure leach circuit at its base metals refinery to leach the copper and the remainder of the nickel, and in doing so upgraded the residue to achieve a PGM concentrate. The project was successfully completed as a LSTK contracting model.

Consulmet Consulting also executed the study by specifying equipment and ancillaries in order to quantify the total cost of the project, and also defined practical timelines for the completion of the project. The total project was executed and commissioned within a period of 8 months from contract award, which realised significant cost savings to the project and client. ■

Consulmet
enquiries@consulmet.com
www.consulmet.com
+27 (0)11 608 0396

CONSULMET®
Production Ready Mineral Processing Solutions
Scaleability, Availability, Reliability