JMB ENGINEERING

ELECTRICAL ENGINEERING CONSULTANCY
Power System Modelling & Protection

TEMPORARY POWER SUPPLY ENGINEERING

Integrating Temporary Generators into Complex Mining Networks.

Hiring a temporary generator plant to power a mine or major facility through a planned outage is a high-stakes exercise. The generator supplier engineers their *generator farm* — but tying that plant into a large, complex mining reticulation network, across long cable and aerial runs and deep into underground workings, is a different problem entirely. JMB Engineering models the integration, proves the site can run safely, and gets the protection right.

THE PROBLEM

Drastically Lower Fault Levels

A generator farm delivers a fraction of the fault current of a utility mains supply. Existing protection relays — set for the grid — can become dangerously insensitive and may never see a genuine fault.

Motor & Transformer Inrush

Starting large motors and energising transformers on a low-fault-level source causes voltage dips and instability that can stall plant or trip the generators entirely.

Sizing & Load Flow Unknowns

Will the generators actually carry the site under real operating scenarios? Undersize and you shed load mid-outage; oversize and you burn budget on plant you never needed.

Outside the Supplier's Scope

Generator hire companies readily admit that site-side power system studies, protection grading and network modelling sit outside their capability — leaving a critical gap the mine carries.

THE JMB SOLUTION

As one of Australia's **leading power system modelling specialists in mining**, JMB Engineering builds or updates the network model with the temporary generator setup and **runs the scenarios** — proving the site can be powered safely and reliably before you commit to the shutdown.

Model the Temporary Setup

We take the existing validated site model and overlay the generator plant — ratings, earthing, step-up transformers and connection point.

Run the Scenarios

Load flow, fault levels, motor starting and transformer inrush — confirming generator sizing and site stability under every credible operating case.

Protect & Report

Protection grading for the reduced fault level, safe setting recommendations, and a clear report your team and the supplier can execute against.

Mining Modelling
LEADERS IN POWER SYSTEM MODELLING

SKM PTW
INDUSTRY-STANDARD POWER SYSTEM STUDIES

Mining Grade
SURFACE & UNDERGROUND COAL EXPERIENCE

MODEL · PROVE · PROTECT

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Proven in the Field: HVO CHPP

A 5-day utility outage, a temporary generator plant, and a design that had to work first time.

CASE STUDY · HUNTER VALLEY OPERATIONS

11 kV Generator Supply Review — HVO Coal Prep Plant

Temporary diesel generator supply for a planned Ausgrid 11 kV substation outage

With the network operator taking the substation that normally feeds the Hunter Valley CPP offline for **five days**, HVO planned to hire a temporary generator plant to keep critical loads running. The original proposal was built around a **single generator**. JMB Engineering updated the site's existing SKM power system model with the temporary setup and ran the full study — and the load flow immediately showed a single unit would **overload and fail**. That finding drove the design to **two 1400 kVA generators in parallel**, then confirmed the whole scheme would run safely.

2 × 1400	5 days	~1.6 MW	>70%
KVA GENSETS IN PARALLEL	PLANNED UTILITY OUTAGE	DIVERSIFIED OPERATING LOAD	FAULT LEVEL REDUCTION HANDLED

The outcome: load flow, IEC 60909 fault, motor-starting and transformer-inrush studies proved the parallel arrangement carried the site with margin, while the protection review found a single relay setting that restored **"best practice" sensitivity** across the entire 11 kV network despite the collapsed fault level — turning a risky temporary supply into a technically de-risked, executable plan.

WHAT WE DELIVER

Load Flow & Generator Sizing

Confirm the temporary plant carries the site under real, diversified operating scenarios — single vs. parallel operation, voltage regulation, and reactive capability — so you hire the right plant, not too little or too much.

Fault Level & Protection Grading

IEC 60909 short-circuit studies at the reduced generator fault level, with protection sensitivity and grading review so every relay still detects and clears faults safely during the temporary supply.

Motor Starting & Inrush Studies

Voltage-dip analysis for large DOL motor starts and staged transformer energisation — preventing stalls, nuisance trips, and generator instability when the plant is at its most vulnerable.

Modelling & Reporting

We maintain your validated SKM model, overlay the temporary setup, and deliver a clear report with operating limits, setting recommendations, and a contingency/load-shedding plan for the outage.

WHY JMB ENGINEERING

- ✓ **Leaders in mining power system modelling** in Australia
- ✓ Deep knowledge of mine reticulation networks, surface & underground
- ✓ Independent, site-side engineering — filling the supplier's scope gap
- ✓ SKM Power*Tools power system studies to Australian standards
- ✓ Protection, earthing & arc-flash specialists
- ✓ Proven on live mining shutdowns & outages

WHO IT'S FOR

Whether you run the mine or supply the generators, the site-side engineering has to be right. We work for both — and generator suppliers welcome the partner who covers what sits outside their scope.

Mine Operators · Generator Hire · Major Facilities

Proven Underground: Ulan West

Two generator farms, a low-fault-level 11 kV network, and protection the supplier's settings couldn't cover.

CASE STUDY · ULAN WEST UNDERGROUND COAL

Generator Fault Level & Protection Review — July HV Outage

Two temporary generator farms powering surface & underground longwall operations through a planned HV outage

With Ulan West's normal HV supply offline for a planned outage, the site ran on **two temporary generator farms** — a 4 MVA farm at the main switchyard and a 5 MVA farm at the Shaft 3 fan site — feeding surface, development and longwall plant through the 11 kV network. JMB updated the site's existing SKM model with the generator setup and ran load flow, IEC 60909 fault and protection studies. The study exposed the real risk: with generation replacing the grid, **11 kV fault levels collapsed to as low as 0.66–1.12 kA** at the longwall — and the **generator supplier's recommended relay settings were too insensitive** to reliably clear a genuine fault.

4 + 5	1.12 kA	627 A	3 gen
MVA DUAL GENERATOR FARMS	LOWEST 11 KV FAULT LEVEL	CORRECTED RELAY PICKUP @ 150 MS	MIN. SAFE OPERATING RULE SET

The outcome: JMB re-specified the 11 kV protection — an **EES-005-compliant 627 A @ 150 ms** setting in the downstream RMU and gen-farm relays that stays sensitive at the collapsed fault level yet rides through transformer inrush. The study also delivered a clear **generator-availability operating rule** — safe on three or four generators, mandatory load-shed on two — packaged for the site's Trigger Action Response Plan (TARP).

WHAT THE STUDY DELIVERED

Fault Levels Across Every Scenario

IEC 60909 short-circuit results at 4, 3 and 2 generators running — from 1.12 kA down to 0.66 kA at the longwall — mapping exactly how protection sensitivity changes as units drop off.

Corrected Protection Settings

The generator supplier's recommended settings were shown inadequate; JMB specified 627 A @ 150 ms in the RMU VIP300 and gen-farm REF651 relays — graded to EES-005 "adequate/best practice" sensitivity.

Load Flow & Voltage Regulation

Confirmed no ampacity issues at reduced outage load, flagged ~6% HV volt-drop at the panels, and recommended downstream transformer tap changes to hold LT outlets at 1.05 pu.

Motor Starting & Operating Limits

Modelled the development miner pump start (18.4% volt dip warning) and translated the fault study into a plain-English "how many generators must run" rule for site operations.

Planning a Temporary Supply?

Talk to us before you finalise the generator plant — we'll prove it works first.

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