

CAPABILITY STATEMENT



DIVERGENT

ENGINEERING

Innovator in Power System Solutions



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Innovator in Power Systems Solutions





COMPANY OVERVIEW

Divergent Engineering specialises in power systems integration, providing electrical engineering solutions including project planning and execution, onsite constructions, and commissioning works.

The founders of our business have accumulated more than 60 years of experience in the resources sector with a focus on delivering customised engineering solutions and development of strategic implementation methodologies reducing site works to achieve the most economical outcome.

MISSION

To provide the best possible solutions to our clients through our full spectrum of electrical design, power studies and modelling, build and onsite services in the mining industry.

VISION

To be the leader of electrical engineering system integrator and design services within Australia through innovative ideas supported by our team's experience.

ABOUT US

Divergent Engineering is a Western Australian-based engineering consultancy specialising in power system integration. Divergent Engineering offers various services, including electrical engineering solutions, project planning and execution, on-site constructions, and commissioning works. We provide turn-key solutions from feasibility, scoping, and detailed engineering design through to procurement and construction.

We are committed to developing and maintaining a highly skilled and dedicated team of Electrical Engineers, Project Managers, and Technicians. Our team is led by four individuals with over 60 years of combined experience in the resources sector, focusing on delivering customised engineering solutions. Our objective is to be recognised as a premium electrical engineering system integrator and design house within Australia by providing cost-effective innovation and practical engineering solutions. We owe it to our team of dynamic and enthusiastic people, who demonstrates our expertise's strengths and ensures complete client satisfaction, with the motto - **Innovator in Power System Solutions.**

Divergent Engineering is ISO 9001:2015 Quality Management System (QMS) and ISO 45001:2018 Occupational Health & Safety, certified. Our team works closely in line with the standards set out in ISO to ensure consistent delivery with the highest quality products and services and demonstrate our commitment to meeting the highest health and safety standards to our employees and clients in the workplace.



OUR CORE VALUES



SAFETY

We ensure health and safety practices on-site and within the organisation is our priority.



QUALITY

Our team is highly qualified and equipped to handle any challenges. With our engineering experience, clients can rely on our commitment to delivering the highest quality of products and services.



INTEGRITY

Our team acts with integrity and honesty, and will adhere to ethical codes of business conducts. We do what we say.



INNOVATION

We promote and support creative thinking, as well as outside-of-the-box solutions. Our business partners can rely on us to remain a step ahead with our innovative solutions.



TEAMWORK

Respectfully working closely with our colleagues, clients and suppliers to deliver the best outcomes for all.

THE MANAGEMENT TEAM



**BRADLEY EDWARDS,
MANAGING DIRECTOR**

Bradley has 22 years of experience in the mining industry across Operations, Utilities, Asset Management and Projects. As an Electrical Engineer, he developed vast experience in power, control and communication systems. Successfully delivering capital projects, his Asset Management and maintenance experience provided in-depth knowledge of reliability, work management, and best practice of electrical assets.

Bradley's notable achievements include managing a major electrical infrastructure project throughout the Pilbara, leading the first conveyor Remote Isolation System in WA and implementing the first Arc Flash program for a major WA Iron Ore company.



**VINCENT CHOI,
DIRECTOR**

Vincent is a challenge-seeker who specialises in project feasibility studies and raising project capital. Vincent has been in the mining industry for over 15 years and started his career at HISmelt Operations, providing electrical engineering expertise to develop cutting-edge high-intensity smelting technology. Vincent was responsible for managing all the power network models for Pilbara Iron.

Vincent led a team of talented engineers in the Asset Management division to provide power system simulation & modelling to major project and operations groups. He was also responsible for implementing the first remote switching system in WA at Pilbara Iron Paraburdoo Mine Site.

Our team is led by four individuals with over 60 years of combined experience in the resources sector



**EDWARD TSANG,
PRINCIPAL ELECTRICAL ENGINEER**

Edward has 20 years of experience as an Electrical Engineer and has been in the mining industry for 15 years. Edward started his career in 2004 with Rio Tinto, a leading global mining group, before joining Divergent Engineering.

Edward is an electrical power distribution expert, mainly LV/HV motors, 33kV distribution system design, battery technologies and systems, transformer procurement installation, and condition monitoring.

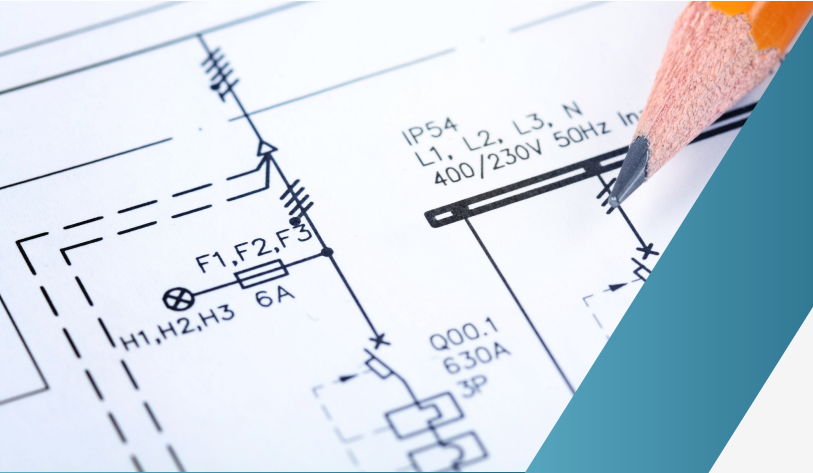
Edward thrives at solving difficult issues under pressure and has a strong skill in electrical building and commissioning.



**KENNY KRAMARA,
PROJECT ENGINEERING MANAGER**

Kenny has worked extensively on design and maintenance of borefield and pumping/storage stations. His experience extends to 20 years within corporate and production systems network infrastructure, 9 years in control systems and 6 years in the electrical power field up to 220kV. Experience covers project design and execution, reliability, and maintenance.

The majority of Kenny's electrical career was in the Pilbara as a Resident Engineer for mining, working to a Principal Engineering position for a large utility. Kenny is an expert in designing systems that capture optimal operability and maintenance with a critical ability to invent efficient and robust systems.



ENGINEERING SERVICES

ELECTRICAL DESIGN

Divergent Engineering uses state of the art technology and innovation for new and existing installations, well-designed systems to minimise energy costs and social impacts.



ELECTRICAL SYSTEMS

Our Engineers can assist with delivering safe, efficient and reliable design and construction of low voltage (LV) and high voltage (HV) electrical installations:

- Network Distribution Design of switchgear, transformer and cable integration
- Overhead powerline design
- Kiosk, Substations and Switchrooms
- Lighting design
- Lightning protection
- Earthing Systems
- Protection systems
- Arc flash mitigation

- Backup power and parallel systems
- Battery charging, auxiliary DC and UPS systems



HYBRID & OFF-GRID POWER SYSTEMS

Our Engineers have developed modelling tools that can help to analyse and engineer your existing system with an integrated hybrid design:

- Ultra-long maintenance intervals
- Substantial fuel cost savings
- Grid import power cost savings



DRAFTING & 3D MODELS

Our team can provide engineered drawing packages, including complete electrical drafting services such as:

- Single line diagram
- Schematic, termination and layout/general arrangement
- Protection scheme diagrams
- Civil site plans and elevation for electrical assets
- 3D drawings of complete electrical assets including cable installations



ENGINEERING SERVICES

POWER SYSTEMS ANALYSIS

At Divergent Engineering, we develop and assess the power system model using DigSILENT PowerFactory, ETAP and SKM Power Tools. Analysis can include:



DATA ACQUISITION AND ANALYSIS

Divergent Engineering can effectively assist in:

- Develop data extraction procedure
- Plan in with shuts or time suitable with the operation
- Provide accessories required for the task
- Perform data science methodology to analyse conditions of assets
- Proposal of system improvement projects



POWER FLOW STUDIES

Using their expertise, our engineers can help ensure:

- Smaller projects to design building load demands and equipment specifications
- Larger projects to design network infrastructure with stability and reliability
- Ensuring redundant paths are capable of capacity
- Creating a stable generation plant



SHOT CIRCUIT STUDIES

Our engineers perform short circuit studies compliant with Australian Standards. We can perform:

- Initial symmetrical RMS short-circuit current
- Rated short-time withstand current
- Short-circuit making current
- Short-circuit breaking current



PROTECTION SETTING AND COORDINATION

Our team's expertise in this area can guarantee a stable and safe system imperative to any energy system. A well-designed system operates safely, without unnecessary disruptions and ensure to remove the risk from your system:

- Review or design protection settings for grading with existing and new systems
- Ensure systems activate when required to ensure the safety of people and prevent equipment damage
- Find solutions to remove unnecessary disruptions
- Simplifying protection schemes for complex networks



ARC FLASH HAZARD ANALYSIS

Our primary priority is the safety of your people and the risk of equipment damage. To make sure this occurs, we perform Arc flash analysis which confirms that equipment is correctly selected and unexpected faults are contained:

- Identify appropriate equipment specifications
- Remove catastrophic risk from existing and new systems
- In many cases, protection schemes can be simply modified to eliminate the risk



POWER QUALITY AND TRANSIENT STUDIES

Divergent Engineering can provide a wide range of options for Power Quality & Dynamic Studies such as:

- Transient stability studies
- Generator and load impact connection studies
- Motor starting analysis
- Harmonic studies
- Reactive power support studies
- Transformer energisation studies
- STATCOM sizing, design and allocation studies



FAULT INVESTIGATION ANALYSIS

Our engineers can investigate electrical faults and provide solutions to improve reliability and safety significantly such as:

- Collect network data
- Review fault sequences down to the millisecond
- Generate simulation of the fault
- Propose solutions to rectify the problem
- Generate fault analysis reports and recommendations



UTILITY NETWORK CONNECTION

We can provide assessments on utility connections, including the required documentation and submissions such as:

- Generation connection to distribution networks
- Network planning studies
- Technical connection assessments
- Review of policies and standards
- Renewable system connection



NETWORK PLANNING

With our team's expertise in network planning, Divergent Engineering can provide the following services:

- Electrical network planning for present and future
- Network reliability assessment
- Voltage stability studies (PV and QV)
- Feasibility studies
- Equipment Selection
- Detailed design, drafting and specification
- Network compliance assessments
- Technical rules compliance evaluations
- Review of policy and standards
- Asset replacement strategy



ENGINEERING SERVICES

RENEWABLE ENERGY INTEGRATION

To remain innovative and relevant, Divergent Engineering is embracing renewable energy integration. Our team has the knowledge and expertise in the integration of large-scale solar farms to battery energy storage systems to microgrid design and control systems for distributed energy resources. The research team at Divergent Engineering is currently actively looking into integrating hydrogen into power systems in Australia's mining sector.



R&D CAPABILITIES

Our R&D space is centred around two major technology axes: energy transformation and power system analysis. As a renewable energy solutions consultant, we can offer services to find the right idea and cultivate it into a resource tailored to your requirements. Our innovation methodology comprises several steps to ensure that customers benefit from a dedicated and efficient process.



CLIENT-DRIVEN INNOVATION

At Divergent Engineering, we are working on the technology of tomorrow, which include:

- Condition monitoring system for transformers
- Power flow controls for system capacity and congestion issues, specialising with variable renewable.
- System designing and sizing to counter intermittency of renewable

- Virtual inertia control system to form virtual synchronous generator for islanded power systems
- Model predictive control (MPC) for smart energy systems
- Control algorithms and devices for smart grid and highly efficient power generation
- Hybrid solution with synchronous condensers and static compensators to achieve power system stability



ON-SITE SERVICES

EFFECTIVE IMPLEMENTATION

Our team of electrical engineers apply their deep knowledge and hands-on experience for effective execution onsite.



EXECUTION

We can synergise our knowledge and resources with yours to help achieve better outcomes. Utilising the same team from design to execution ensures accountability sits with one group. We can provide:

- Formal rectification notices
- Systems installation and integration



TESTING SERVICES

Divergent Engineering uses methods for validating the design, including testing by exposing the asset to similar controlled conditions. In some cases, the conditions applied are proportionate to avoid safety hazards during testing. can provide the following services to protect your assets:

- Relay testing
- Function testing
- Transformer Testing
- Cable Testing



SPECIALIST SERVICES

A complex problem can require specialised services to reduce time and unnecessary costs. Being able to provide positive support to lead or work with you is very important to Divergent Engineering.

We have an in-house team with extensive experience in Research and Development in variable speed drives and inverters. Our team's broad expertise ensures the development of the ideal solution for your application.



INSPECTION TEST PLAN DEVELOPMENT

We assist our clients with a well-developed test plan which is critical to avoid unplanned power outages. A test plan ensures a series of verified steps are completed in a specific order and enhances risk mitigation for technicians during time-critical work:

- Protection test plan developed from documentation and site inspections
- Should accompany any changes required in a protection system
- It can easily be developed for other systems to minimise risk
- Compiled on your preferred template or our developed template

PROJECT PLANNING

We view project planning as a strategic function required for successful project completion and to maximise your business success. We are project managers as much as we are electrical engineers.



FEASIBILITY STUDIES

Divergent Engineering can provide complete documentation to ensure transparency:

- Conceptual Studies/Design
- Scope Identification
- Equipment Specifications
- Cost Optimization/Alternatives
- Technology Evaluation and Recommendations
- Modular Construction Options
- Construction Review
- Risk Management Evaluation
- Debottlenecking
- Options Analysis
- Regulatory Compliance



DETAILED ENGINEERING STUDIES

Services provided by Divergent Engineering include:

Cost Estimation:

- Material bill of quantities
- Labour and plant quantities based on a breakdown of tasks
- Overheads such as engineering and project management

Tender Management:

- Tender documentation preparation
- Formulating evaluation criterion
- Evaluate and provide a recommendation.



BUILDINGS, CIVIL AND STRUCTURAL DESIGN

Divergent Engineering delivers buildings, civil and structural services as an integrated offering to supplement its engineering services, providing solutions for power lines, substation building and kiosks, switchroom foundations and communication infrastructure.



POWER LINES

With a range of modelling techniques and experience in standards, our team can help you with:

- Designing the foundations for poles and towers
- Pole and tower infrastructure up to extra-high voltage and fibre optic communication networks
- Execution of projects from concept to commissioning



SUBSTATION BUILDINGS AND KIOSKS

Divergent Engineering has years of experience in maintaining substations and kiosks, we have compiled many improvements to the designs that we have seen and are able to customise all of them into one as per your requirements:

- Smart cable pathed switchrooms with top and/or bottom cable entry
- Extensible kiosk designs with optimal layout
- Minimised transportation costs in design

BUILDINGS, CIVIL AND STRUCTURAL DESIGN



FOUNDATIONS

Divergent Engineering is not only confident in designing electrical components but also have a team of experts who are capable to design the civils such as:

- Outdoor switchyards
- Smart cable pathed switchroom foundations and supports
- Kiosk foundations with under kiosk pit access



RADIO BASE STATIONS

Our team members have years of experience in corporate and process communications and can assist in designing communications infrastructure such as:

- Communications towers
- Communication buildings
- Efficient and reliable off-grid power supplies





PRODUCTS



DISTRIBUTION TRANSFORMERS

We specialise in distributing Distribution and Hermetically sealed oil-immersed transformers manufactured to IEC60076 ranging from 100kVA to 15MVA. Different types of Transformer installations include

- Pad-mounted
- Pole mounted
- Self-bunded kiosk arrangement.



KIOSK SUBSTATION

Divergent Engineering has years of experience in substations and kiosks design, installation, and maintenance. We have compiled many improvements to the designs that we have worked on and are able to integrate them into one to meet your requirements.



TRANSPORTABLE SWITCH ROOMS









Our expertise lies in our ability to custom design switch rooms according to the client's requirements and construct them at one of our local partners' facilities. Our switchrooms are designed to incorporate all the factors like fire protection, harsh environment, operating conditions and HVAC (heating, ventilation and air-conditioning) into considerations.



MCC'S & DISTRIBUTION BOARDS

We can customise MCC & Distribution Boards to suit any specification. We work closely with our local partners to deliver the most economical solution to suit all applications.

RECENT KEY PROJECTS

CLIENT	PROJECT NAME	PROJECT TYPE	SCOPE OF WORK	LOCATION
	Cherratta Lodge, Karratha	Village Diesel Generator Control Systems Upgrade	Supply and installation of new generator controllers, including programming of control modules and commissioning testing	Karratha, Western Australia
	Transformer Testing	Engineering Services	DGA and safety guard's performance testing on all distribution transformers	Gruyere Mine Site
	MC014 EF relay testing and vibration investigation	Engineering Services	Earth fault relay performance testing and vibration investigation on MC014 switchboard	Gruyere Mine Site
	Solomon Sample Station Cutter Upgrade	Engineering Services	Engineering design and PLC work for the integration of new sample cutter with existing instruments at the Sample Station	FMG Solomon Mine
	Arc Flash Studies on Switchboards	Engineering Study	Arc flash analysis and labelling on required switchboards	Divergent Engineering, West Perth office
	132kV Transformer Services	Engineering and Site Supervision	Maintenance performance on two 132kV transmission transformers	Talisson Lithium Greenbushes Mine Site
	Newmont N03HWP Project Stage 1 Phase 1 & 2	Engineering Services	Engineering design for the required electrical system	Divergent Engineering, West Perth office & Newmont Boddington Gold Mine
	Engineering Partner for the development of Vanadium Battery	Engineering Services	Customised engineering design works based on client's specifications and requirements on battery. Supervision of the end product's construction and performance of factory acceptance test	SMC Workshop



GET IN TOUCH

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