

Stark[®]

engineering
consulting





listen
advise
deliver

providing flexibility and
innovation for your
engineering challenges

About Stark

Stark Engineering Consulting (Stark) offers flexibility and innovative solutions in water, hydro power, cogeneration and control & monitoring. Backed by decades of real-world engineering experience and technical expertise, we can handle projects or integrate with any team to find and implement solutions.

We add value, eliminate waste and reduce risk across a project's life cycle- from concept, design, installation and commissioning to ongoing operation, maintenance and end-of-life management.

Our vision is to assist our clients with their engineering projects by offering unique client-focused and cost-effective solutions with a strong ethos for quality.

We call it INTERESTING ENGINEERING.

We work as a team with our clients to look for innovative solutions that will move their business forward. We look beyond cookie-cutter solutions, always delivering long-term, sustainable answers.

Whilst relying on decades of experience, we continuously strive to remain relevant in tomorrow's digital age. Our uncompromising standards have led us to work with some of Australia's biggest and brightest organisations. We stand by our work and advice, so if you see Stark on it, you know you can trust it.



Water



Cogen



Hydro



**Monitoring
+ Controls**

 Stark

Cogeneration

 Stark

Water

When it comes to cogeneration systems, Stark touts an unrivaled expertise across the entire engineering lifecycle. Whether you require feasibility studies or ongoing plant optimisation, green field projects or squeezing the last drops of efficiency from an ageing plant, Stark have you covered. Our first-line support and monitoring is manned by experienced field engineers and always backed by OEM qualified maintenance partners. This allows Stark to offer a comprehensive call-out and overhaul service.

Stark understands that cogeneration doesn't stop with the engine package - for maximum return the operation of plant and engine need to be in balance.

This is where Stark's capabilities in thermal-hydraulic design, mechanical and controls design, gas handling and conditioning, heat recovery and anaerobic digesters come to the fore.

Water and wastewater treatment is a challenging area in Australia due to population densities, growth, environmental regulation and unique climate conditions. Stark has the necessary understanding and experience with treated water guidelines and risk-based treatment requirements of water recycling to provide effective solutions for all types of water treatment. Our designs are based on a comprehensive understanding of water chemistry and microbiology.

Stark brings simplicity and reliability while meeting all statutory and aesthetic water requirements.

Stark has been involved in the development, construction and commissioning stages of water projects. We have delivered as both owners-engineer and as contractors, so we understand the careful balance between cost and quality.

Stark has particular experience dealing with:

- Plant operation and maintenance
- Water treatment process design
- Biological nutrient removal systems
- Stormwater harvesting schemes
- Reuse schemes
- MBR plants
- Digestion and resource recovery
- Membrane plant design



Hydropower

Stark is a multi-disciplinary consultancy with hands-on capabilities and experience in small and medium scale hydro-turbines. Stark currently has multiple hydros under O&M management and has the capability to deliver hydro projects from feasibility through to construction, commissioning and operation and maintenance. Our in-house expertise covers rotating machinery, major plant and machine controls and ancillary equipment.

If you are looking for a cost reduction via energy harvesting or feeding the grid as a revenue stream, call Stark.

Stark have performed major rebuilds of Sydney Water's two largest hydro turbines. Both required significant redesign and refurbishment and both projects have delivered tangible results to the client. Our productive relationships with key suppliers and contract partners allow us to create cost effective and risk managed designs, and maintenance strategies.



Monitoring + Controls

At Stark, we understand the assets we are working with. We can ensure ongoing operational efficiency is maximised via real-time monitoring, data collection and analytics. We combine a data-driven focus to operation and maintenance with an intimate knowledge of traditional electrical design and control systems (PLC, HMI and SCADA).

What takes Stark to the next level, is our integration of control systems with the industrial Internet of Things (IoT) and edge-of-network data capture from remote low-bandwidth applications.

Our in-house systems have been adapted by our clients to boost efficiency in packing line throughput, process control of remote water dosing plants and uptime of distributed electricity generation.

Stark offers real-time monitoring, alarm-forwarding and remote diagnostics on a 24/7 basis through our team of qualified process and control engineers.

The correct data to the correct people in the correct format.

Because data visualisation is key to operational efficiency, we create insightful real-time dashboard overviews and automated process, efficiency or alarm reports for our clients, enabling a holistic process review and corrective action capability.



Cogen Case Study

As part of the construction of two new cogeneration plants at the North Head and Cronulla sewage treatment plants, Stark were engaged to perform detailed design and commissioning. The project upgraded the existing cogeneration unit at Cronulla from 475kW to 835kW and installed an additional 1MW cogeneration unit at North Head.



The project was aligned with Sydney Water's Energy and Greenhouse Gas Mitigation Strategy to reduce greenhouse gas emissions by on-site generation of renewable energy and a cost-benefit to Sydney Water.

Scope of Works:

- Process, mechanical and controls design for:
 - biogas conditioning plant upgrade
 - heat recovery
 - overall control and integration with the anaerobic digesters
- Unit sizing
- Mechanical layout and arrangement
- Commissioning and testing of the units
- Contract management for the two GE Jenbacher engine packages

As an ongoing partner in Sydney Water's renewable energy plan Stark is continuing to supply a range of cogeneration services for the complete Sydney Water portfolio; planned maintenance, (minimising downtime and plant disruption), breakdown support, (returning your plant to service), 24/7 technical phone support, operational support, spare parts & consumables and system audits.



Hydro Case Study

Sydney Water operate a hydro turbine at the outlet of the Warragamba pipeline within the Prospect Outlet works. The hydro consists of a double regulated Kaplan turbine, rated at 3.7 MW coupled to an induction generator, with a projected generation of 14.1 GWh p.a. The hydro turbine provides electricity at 11 kV for on-site usage, with excess exported to the public grid.



After 2 years of operation, Sydney Water had incurred significant expense in lost generation, due to partial loss of Kaplan blade functionality and early onset of internal turbine corrosion and two unsuccessful bearing repairs. Following the award of the turbine's operation and maintenance to P.E.T. and Stark, a fresh set of eyes was brought to bear on the problem. An extensive remediation program was undertaken, starting with thorough inspections, root cause analysis and options review.

A two-step remediation was implemented:

- Stark and P.E.T. completed a full redesign and modification of the non-drive bearing arrangement to ensure return to operation as soon as possible. Stark provided project management, concept and detailed design, supervision of manufacturing and installation and final commissioning and testing.
- In a second phase, design improvements were combined with a complete replacement of the rapidly ageing turbine runner assembly. For the new runner, Stark cooperated closely with Italian manufacturer Orendine to deliver a high-quality, high-performance, fully stainless assembly. Stark provided project management, design review and overseas quality inspection, supervision of manufacturing and installation, stakeholder management and final commissioning and testing.

Since remediation, no further turbine failures have occurred and the client is on track to exceed the original design lifetime of the plant.



Water Case Study

Stark provided commissioning management support for the Kangaroo Valley & Robertson Membrane Bio-Reactor (MBR) waste water plants, both plants were developed from a Siemens MBR process design and were part of a major investment by Shoalhaven City Council and



Wingecarribee Shire Council. Leaning on our extensive commissioning experience with membrane tertiary & water treatment plants, Stark supplied the Lead Process Engineer and was responsible for all commissioning tasks. Stark undertook trouble shooting for mechanical and electrical failure, fault finding on PLC issues and process optimisation. Stark was responsible for the liaison and coordination with other contractors and suppliers for the completion of the commissioning.

Stark acted as the bridge between the construction and design teams to streamline the commissioning works and acted as process engineer on behalf of Lucas in meetings with Wingecarribee Shire Council and Public Works.



Stark has since been engaged directly by Shoalhaven Water and Wingecarribee Shire Council to provide operation and maintenance support for these plants.



Controls Case Study

Sydney Water has 14 generation assets across 10 sites. Each site controls and monitors their own generation assets. This leads to a disconnected communication channel to notify O&M teams when the generation units are not operating at peak performance or when they trip. The maintenance



and engineering team often found themselves responding only to find that the problem could have been rectified with remote intervention or trending analysis.

The STARK DASHBOARD provides a central monitoring and reset system for all generation assets. The use of leading IoT and cellular technology allows reaching even the most remote sites.

Aggregated onto a single screen the STARK DASHBOARD displays the instantaneous and historical vital generation values along with status signals. The dashboard is powered by an Inductive Automation Ignition SCADA backend, delivering an interface responsive for any device.

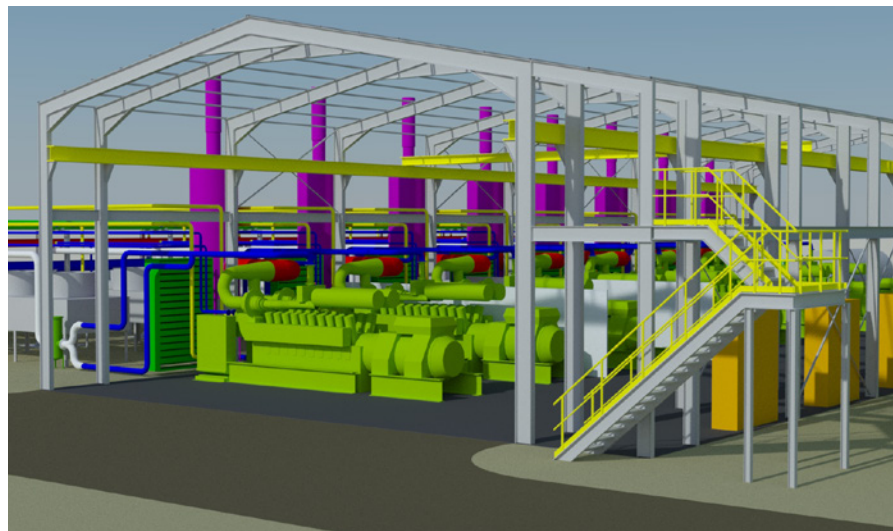
As an example of immediate benefits, within weeks of adopting the dashboard, operators noticed that during high flows, generation at the Woronora hydro would spike and subsequently cause a shutdown without alarm. Intervention from the O&M team identified and rectified the control issue remotely and increased high-flow uptime by 40%. Without the STARK DASHBOARD, this fault would have gone unnoticed leading to lost generation.



Design Case Study

As part of a planned expansion of an above-ground mining operation, Stark was engaged to review a suitable relocation and upgrade strategy for an existing 9MW power station. To facilitate a final 24MW capacity an additional 5x3MW gas engines were added to the 3x3MW relocated engines. 3 options were presented in terms of plant layout.

- individual modules similar to the existing design
- individual containerised modules
- a purposely built power station housing



The engagement covered the concept design and costing for the purchase and installation of:

- new generator sets
- associated gas handling plant and ongoing operation
- all instrumentation and piping
- the electrical design of both HV and LV switch rooms
- construction cost
- fire safety and environmental considerations.

Each option was fully costed with an estimate of program duration. Stark also evaluated Alternate Plant Configurations in particular the use of one or more open-cycle gas turbines in conjunction with generator sets to maximise the use of the variable gas feed and optimise returns during periods of high electricity usage.



Credentials & credibility

Stark is proud to have worked with some of Australia's biggest and brightest organisations.



Interesting engineering



Because every client is unique and every project is unique Stark believes every solution should be unique. INTERESTING ENGINEERING means looking beyond the cookie cutter solutions, always delivering high quality, long-term sustainable answers.

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