

# Alderley

Technical excellence: delivered

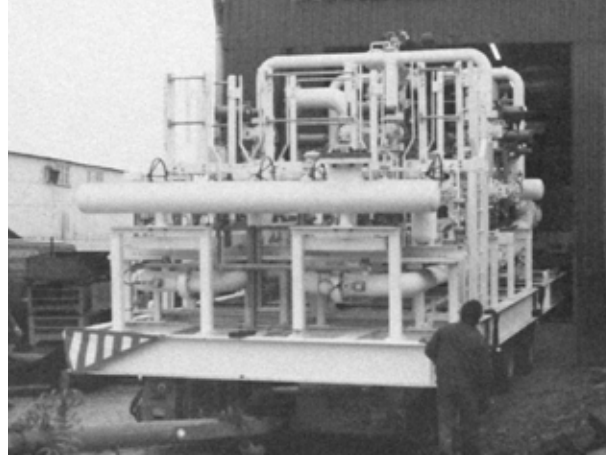


# Hydrogen

Innovative engineering solutions for Hydrogen applications



# About Alderley



## The integrated solutions provider for the global energy industry.

Our priority is to maximise the value and efficiency of our clients' energy assets – from concept to operation and beyond.

We do this through our integrated energy solutions: advanced digital, mechanical, hydraulic, electrical, process and aftermarket solutions to meet the challenges and needs of a global energy system in transition.

It's our people that make the difference.

Our local teams work closely with our clients to understand their needs and deliver the right solution – with the flexibility, integrity and customer service you expect from a family business.

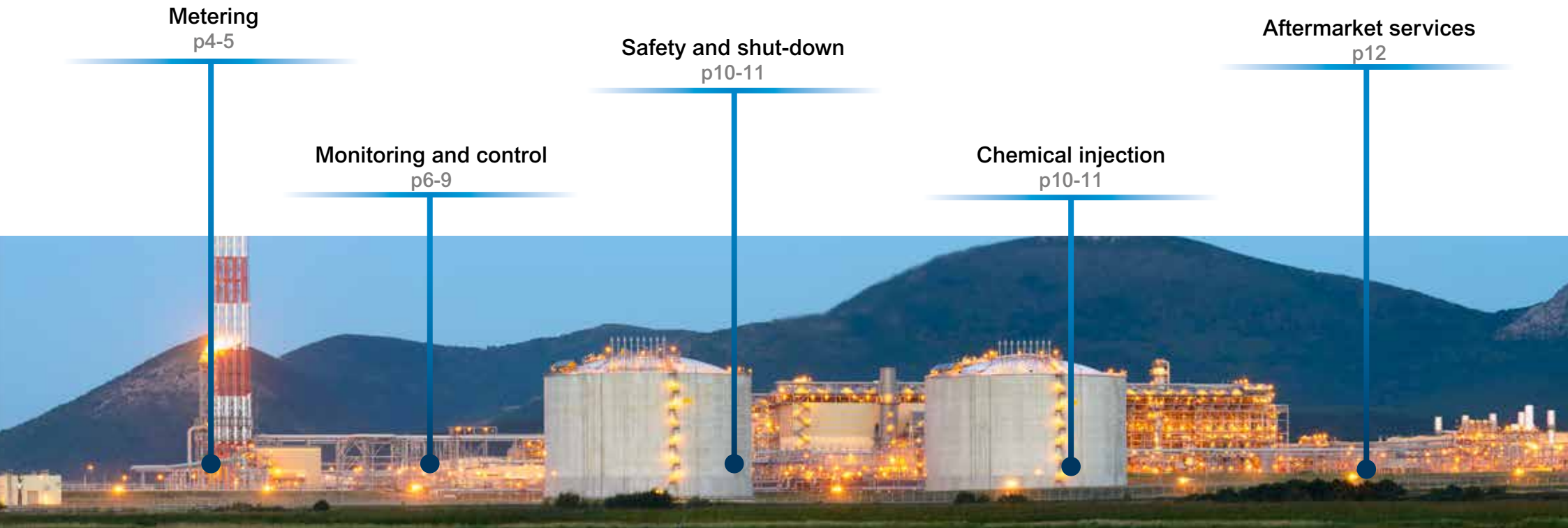
As an independent system integrator with over 60 years of experience, Alderley is best placed to advise upon and deliver innovative solutions to help improve the efficiency and reduce the environmental impact of your energy operations.

That's why we have introduced our better-for-environment: better-for-business initiative - an initiative to help our clients identify solutions that can support their environmental objectives.



# Overview

## Hydrogen Solutions



# Systems Metering

## World-class hydrogen metering systems

- Hydrogen Metering
- Loading and Storage
- Sampling and Analysis Systems
- Control and Supervisory Systems

Our intimate knowledge of flow measurement solutions helps you achieve your operational, financial, contractual and regulatory commitments.





## Custody Transfer and Allocation Metering

Ensuring continued flow measurement system performance is of paramount importance.

As an independent systems integrator with more than 60 years of experience in delivering highly reliable Metering Systems, our engineers are best placed to meet your flow measurement requirements.

Fully versed in all relevant international standards and metering technologies – including ultrasonic, orifice, turbine, Venturi, coriolis and PD meters – you can be assured that an Alderley flow measurement solution is the best-for-application and best-for-business solution.



## From Concept to Delivery

From project inception, our experts partner with you to help minimise costs and improve efficiency without ever compromising quality, safety and operational performance.

And as an independent systems integrator, we can identify and expertly integrate the latest technologies to meet your project requirements.



## Hydrogen Metering

As solutions providers, Alderley has already tackled many of the challenges associated with hydrogen measurement such as leakage, velocity, cavitation and density due to its small molecules.

### Related experience

- Hydrogen measurement using coriolis meter with sampling and controls, Saudi Arabia
- Ammonia measurement using ultrasonic meter with controls, Middle East
- Helium measurement using ultrasonic meter with sampling and controls, Qatar
- Dynamic LNG flow measurement using ultrasonic meter with check metering system operating at  $-162^{\circ}\text{C}$ , Qatar
- Sulphur measurement using twin-walled coriolis meter operating at  $+275^{\circ}\text{C}$ , Saudi Arabia
- Hydrogen refueling station for vehicles, United Arab Emirates

## Sampling and Analysis

High-accuracy gas flow metering needs representative product quality measurement.

Therefore, there is often a requirement to integrate real-time measurement of density, chromatographic composition, Wobbe index, calorific value, dewpoint and sulphur into a Gas Metering Package with associated pressure reduction, filtration and gas conditioning systems.



## Control and Supervisory Systems

With vast experience in all types of Metering Control Systems – from simple, standalone flow computers to sophisticated panels incorporating dual redundancy – Alderley's dedicated Control Systems engineering team has successfully designed, manufactured, tested and delivered hundreds of Control Systems.

We work with all major flow computer suppliers, including Omni and Emerson. But our independence and technical ability mean that we can design and deliver the metering control solution that best meets your individual needs.

# Next Generation Asset Management



## Connected, smart, accessible and secure

Smart Asset Management from Alderley is an advanced, fully integrated, and fully supported solution to ensure the ongoing performance of your most critical assets: your measurement systems.

Combining Alderley's industry leading knowledge of custody metering systems with the latest connected and cloud platform technologies, Smart Asset Management is tomorrow's next generation asset integrity management solution, delivered today.

- ✓ Transforms data into remotely accessible insight
- ✓ A specialised measurement digital-twin
- ✓ Flexible and scalable to cover all operations
- ✓ System agnostic to integrate with all your metering assets, regardless of OEM
- ✓ Deep-dive and diagnostic capabilities
- ✓ Supported by local and remote field service teams
- ✓ Better for business and better for the environment
- ✓ Delivering enhanced performance, confidence and control

# Smart Asset Management

Smart Asset Management consists of four configurable modules, all available through an annual license and all seamlessly integrated with Alderley Connect™.

Aftermarket  
Healthcare Plan

Delivering peace of mind with proactive and rapid-response reactive field service solutions

Maintenance  
Manager

Asset information, parts ordering and maintenance scheduling at your fingertips

Complete certainty, confidence and control of the performance of your measurement system

Smart Metering

Assured performance and reduced operating costs throughout the life of your measurement system

Condition Based  
Monitoring

Alderley Connect  
The connected, secure, flexible and scalable data acquisition and transfer solution

Transforming your measurement data into remotely accessible insight

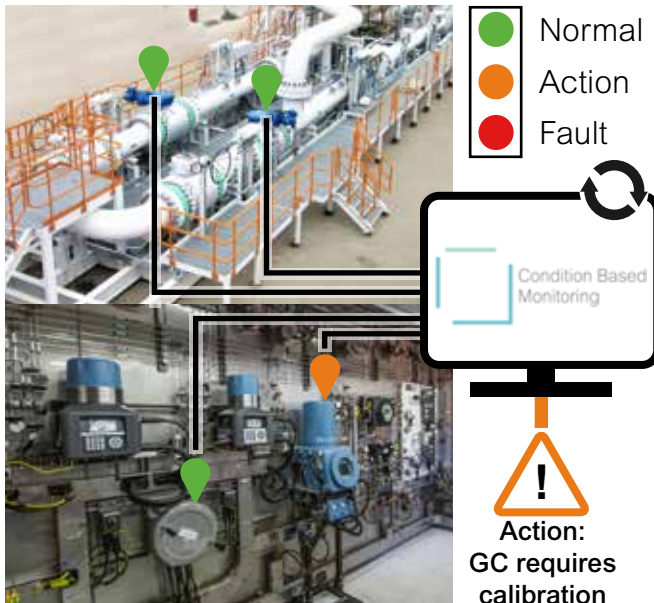
Smart Asset  
Management

# Condition Based Monitoring

Assured performance and reduced operating costs throughout the life of your measurement system



**CBM by Alderley provides real-time insights and alerts operators to potential faults as soon as they arise**



## Minimising the risk of downtime

Through continuous assessment of your equipment, Alderley's innovative Condition Based Monitoring (CBM) solution supports the early detection of potential problems with your assets.

This allows you to schedule maintenance exactly when it is needed.

## Deep-dive and diagnostic capability

With clear 'traffic light' status indicators, integrated OEM reporting tools, built-in troubleshooting and deep-dive capabilities to support prompt and effective remedial activity in the event of a fault, CBM by Alderley delivers assured performance and reduced operating costs throughout the life of your measurement assets.

**Assured asset performance**

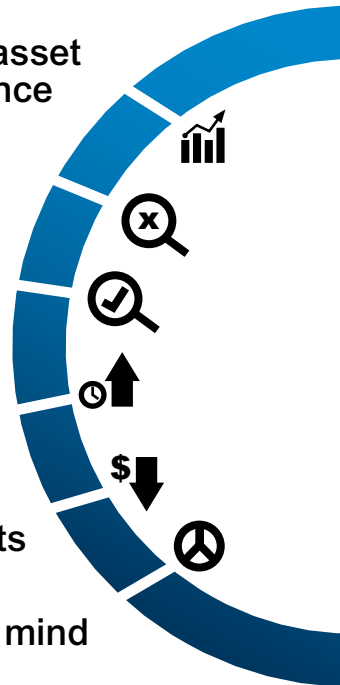
**Prompt fault identification**

**Prompt fault resolution**

**Reduced risk of downtime**

**Reduced costs**

**Peace of mind**





# Smart Metering

**Complete certainty, confidence and control of the performance of your measurement system**

Smart Metering



## Measurement excellence: in a software solution

Developed in conjunction with the flow measurement experts at KELTON™, Smart Metering gives you complete certainty, confidence and control over the performance of your measurement system.

## The smart solution

Connected to the Alderley Condition Based Monitoring system, or your asset's pre-installed CBM\*, Smart Metering is the 'smart' in Smart Asset Management.

Central to the effectiveness of solution – and the functionality that makes it smart – is the ability to quantify the significance of a change in measurement performance, including its potential financial impact.

It achieves this by dynamically assessing the uncertainty of your measurement system – at a corporate, system and granular instrument level – and quantifying its drift when an event or change in performance occurs.

## Enhanced decision-making

This ability to calculate the change in uncertainty, the impact on bias, and the subsequent financial exposure is essential for truly effective remote operations.

And through Smart Metering's specialised measurement digital-twin, you can model the impact of corrective actions prior to deploying live onsite; supporting your decisions about the efficient scheduling, prioritisation, maintenance utilisation and safety of your resource – wherever you, or your asset, are in the world.



\*Smart Metering requires Condition Based Monitoring by Alderley, or a suitably specified alternative. Requires configuration. Remote reporting and dashboard through Alderley Connect.

# Systems

# Flow Control and

# Safety

Process control systems to enhance operator safety

- Gas Modular Wellsite Skids
- Wellhead Control Panels
- Emergency Shut Down
- High-integrity Pressure Protection
- Surge Relief Systems

From wellhead to point of sale: flow control and safety systems are essential for the ongoing efficiency and safety of your operations.





## Safety Systems

From wellhead to point of sale: flow control and safety systems are essential for the ongoing efficiency and safety of your operations.



Emergency Shutdown Systems (ESD) offer an essential layer of protection in the event of an emergency, seamlessly shutting down processes in a structured and reliable manner to protect your people, equipment and the environment.

Designed in accordance with IEC 61508 and IEC 61511, our High-integrity Pressure Protection Systems (HIPPS) prevent the over-pressurisation of pipelines and downstream plants. Employed in high pressure processes, HIPPS will close dedicated shut-off valves if the pressure exceeds the defined system parameters.



## Surge Relief Systems

Used on a range of applications, including pipelines, storage terminals, and marine loading and offloading, our Surge Relief Systems respond quickly, yet smoothly in the event of an emergency to release excess pressure into a dedicated safety outlet.



## Chemical Injection Systems

Delivering a highly accurate and repeatable dosage, our Chemical Injection Systems can introduce a wide range of chemicals either at a fixed pressure or to a required flow rate with closed loop feedback.



Systems can be provided as a standalone solution or integrated as part of a wider processing solution, for example hydrate inhibitor injection on a Modular Wellsite Skid.

Key features typically include:

- Accurate dosing rates from  $<0.01\text{l/min}$  to  $>400\text{l/min}$
- Integral autonomous PLC or interfaced to platform MCS
- Integral autonomous MCC or interfaced to platform MCC
- Integral or standalone tanks
- HVAC Systems for high and low ambient temperature environments

# Aftermarket Services

With extensive experience across metering, process, hydraulic, mechanical, electrical and control systems, we are your one-stop-shop services provider. And as an independent family business, we will always deliver the best-for-application and best-for-business solution for your needs.

## Genuine Parts and Spares

- Just-in-time spares management or a single source for reactive parts
- Global supply chain delivering the right quality at the best value
- Helping you plan and reduce your OPEX through effective parts and spares supply

## Training

- Benefit from the Alderley experience: Specialist training for Metering, Produced Water Treatment and Modular Wellsite Skids
- Enhancing system awareness and operator safety before and during operation
- Delivered online or face-to-face; on-site, in the classroom, or both with Virtual Reality

## Field Services

- Dedicated Field Services team with flexible arrangements
- Supporting both preventative and rapid-response maintenance requirements
- Including: long-term service agreements; full vendor maintenance contracts; 24/7 support; management of calibration and revalidation; and site audits



## Asset Integrity and Inspection

- Close, visual and detailed inspection services utilising our digital tool, Inspection Manager™
- Health and criticality assessments to proactively manage your risks from obsolescence
- Full healthcare service packages to remove the complexity from your day-to-day operations
- All remedial actions can be completed by our experts for a prompt resolution

## Condition Based Monitoring

- Condition Based Monitoring utilising Dynamic Uncertainty and remote diagnostics
- 24/7 performance monitoring
- Providing real-time insights and alerting you to potential faults
- Delivering assured system performance, reduced costs and complete peace of mind

## Modifications and Upgrades

- Brownfield metering, produced water treatment, hydraulic control and process system upgrades
- System re-rates and modifications to best suit the latest process conditions
- Digital and cyber security upgrades, including system modifications to retro-fit the latest technologies, such as IoT and remote monitoring solutions



# Full Systems Overview

Repeatedly partnering with some of the biggest names in the energy industry, our solutions have been installed in offshore, onshore and floating facilities worldwide.

## Flow Control and Safety Systems



- Oil and Gas Modular Wellsite Skids
- Chemical Injection Units
- High-Integrity Pressure Protection Packages
- Emergency Shutdown Systems (ESDs)
- Surge Relief Systems
- Hydraulic Power Units (HPUs)
  - Including HPUs for: LNG Transfer, Barrier fluid (BF), Control fluid (CF), Production and Subsea Control Systems, Swivel Barrier Fluid, Turret SDV and Turret DTM
- Intervention and Workover Control Systems
- Wellhead Control Panels
- Testing and Flushing HPUs
- Topside Umbilical Termination Units
- Hydraulic Reelers
- Hydraulic Control Panels
- Ballast Control Systems
- Bunkering Hose Stations
- Electrical Control Panels
  - Including: LV Switchboards, Motor Control Centres, Generator Control Systems, Master Control Systems, Fire & Gas Control Panels, Programmable Logic Controllers and Main Switchboards
- Pressurised Control Cabins
- Hoses
  - Including: Hydraulic, High Pressure Subsea, Umbilical, Bunkering, Ship-to-Ship, Fire Safe, Drilling, Rotator and Cement Hoses

## Flow Measurement and Transfer Systems



- Gas Metering Systems
  - Including: Hydrogen, Ammonia, Helium, Natural Gas, Bio-gas, Methane, Butane, Propane, Ethane, Boil-off Gas, Flare Gas, Sales Gas and Feed Gas
- LNG Metering Systems
  - Operating at cryogenic temperatures to -162°C
- Liquid Metering Systems
  - Including: Crude, Heavy Oil, Condensate, Diesel, Kerosene, Jet A-1/JP-8, Fuel Oil, Liquid NGL, LPG, Naptha, Propylene, BTX (Benzene, Toulene, and Xylene), Sulphur and Asphalt (operating temperature of +260°C)
- Custody / Fiscal / Allocation Metering Systems
- Truck Loading and Unloading Systems
- Proving Systems
  - Including: Bi-directional Provers, Small Volume and Portable Provers and Water Draw Calibration
- Measurement and Control Instrumentation
- Gas Sampling and Analysis Systems
  - Including: Chromatography, density, Wobbe index, calorific value, dewpoint and sulphur analysis
- Liquid Sampling and Analysis Systems
  - Including: Fast loop or insertion automatic sampling, single or multiple atmospheric or pressurised sample receivers, density and viscosity measurement, water-cut analysis, RVP analysers and LPG chromatographs
- Control and Supervisory Systems
- Condition Based Monitoring System

## Separation and Treatment Systems



- Primary, Secondary and Tertiary Produced Water Treatment Solutions
- Separators
  - Including: 2- and 3-phase separators, and internals only solutions
- Deoiling Hydrocyclones
- Induced Gas Flotation
- Degassers
- Compact Flotation Units
- Filtration
  - Including: Guard Filters, Cartridge Filters, Nutshell Filters, Adsorption Filters and Media Filters
- Coalescence
- Chemical Injection Units
- Desanding Hydrocyclones
- Wellhead Desanders
- Solids and Sand Management

## Global Standards

All systems are developed in-house and can be designed to meet various global standards, including:

- |                            |                          |
|----------------------------|--------------------------|
| • NORSOK                   | • PED                    |
| • BP, Shell, Total, Maersk | • ASME                   |
| • Saudi Aramco             | • AISC, ASCE, Eurocode   |
| • SEGAL                    | • ANSI, MSS              |
| • GOST, IECEX, ATEX,       | • API (Incl. 6A and 17F) |
| CSA, FM, UL                | • EN / ISO               |
| • ONML                     | • DNV                    |

# Alderley

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