

OIL & GAS custody transfer
metering and control **solutions**

Reference Projects



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Reference Projects

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2004 BOTAS Natural Gas Distribution Stations

Quick Facts		
Year built	2004 through 2006	
Customer	Pasiner A.S.	
End-user	BOTAS Pipeline Co.	
Location	Various locations in Turkey	
Sizing	2" through 12"	
Capacity	2,000 to 150,000 Sm ³ /h	
Measurement	Turbine meters	
Pressure	40 to 75 barg	
Material class	Carbon steel, ANSI specifications	

Project Description


Between 2004 and 2006, the BOTAS gas distribution pipeline network in the south of Turkey was expanded considerably with the 240 km Malatya-Gaziantep pipeline and the 284 km Gaziantep-Osmaniye-Adana-Mersin pipeline. Together with Turkish manufacturing company Kalekalip A.S., iSystems designed and supplied 22 high-pressure takeoff stations supplying gas to major cities and industries.

Scope of Work

22 high-pressure pressure reducing & metering stations were supplied, each one consisting of:

- Station inlet- and outlet ESD ball valves, equipped with gas-over-oil actuators;
- Filtering section with 2x 100% dry gas filters, designed in-house, with quick-opening closures;
- Pressure reducing section with 2x 100% pressure letdown streams, each with Shell & Tube heat exchangers for gas preheating. The pressure regulators are pilot-operated monitor/active devices, complemented by slam-shut valves;
- Flow metering section with 2x 100% turbine metering streams and "Z"-connection for meter verification;
- Process Gas Chromatograph with sample takeoff and sample conditioning;
- Station Control Panel with flow computers, station control PLC system, and PC-based Supervisory/HMI.

2004 Panaran MRS Analyzer and Station Control System

Quick Facts		
Year built	2004	
Customer	RMG Gaselan	
End-user	PT Perusahaan Gas Negara	
Location	Batam Island, Indonesia	

Project Description

In 2004, the new Panaran gas-fired power plant was commissioned on Batam Island, just off the coast of Singapore. For this power plant, the German company RMG Gaselan supplied the natural gas pressure reducing and metering station.

Scope of Work

iSystems supplied the gas analyzer system and station control system to RMG Gaselan.

- Prefabricated analyzer shelter with process gas chromatograph, H₂S/total sulphur analyzer and moisture analyzer. The analyzer shelter is equipped with explosion proof air conditioning, and fire & gas detection systems.
- Station Control Panel with flow computers, station control PLC system, and PC-based Supervisory/HMI.

2005 EGO MRS Revamp & SCADA systems

Quick Facts	
Year built	2005
Customer	Kalekalip A.S. and EGO
End-user	EGO
Location	Ankara, Turkey
Sizing	3" through 20"
Capacity	up to 125,000 Sm ³ /h
Measurement	Turbine meters
Pressure	25 to 50 barg
Material class	Carbon steel, ANSI specifications



Project Description

The 18 high-pressure City Gate Metering & Pressure reducing stations of the Ankara gas distribution network were in need of a revamp to meet the requirements of Custody Transfer Metering under the natural gas supply contract. At the same time, EGO endeavored to automate these stations and hundreds of other small, low-pressure stations which would allow them to monitor and control the complete Ankara gas distribution grid from a central SCADA system supplied by Valmet Automation.

Scope of Work

- iSystems performed a site survey of the 18 City Gate stations as well as the low-pressure stations, made an uncertainty assessment and a full report, with recommendations for the revamp operation, to EGO;
- Basic and detailed engineering for the revamp of the 18 City Gate Stations, site supervision and project management during the actual revamp works;
- Design and supply of Metering Panels with flow computers and PC-based Supervisory/HMI for each of the 18 City Gate Stations;
- Basic design of a simple, standardized SCADA system for the remote monitoring of some 400 low-pressure M&R stations.

2006 Petkim Aliaga MRS

Quick Facts	
Year built	2006
Customer	Europower / Ansaldo
End-user	PETKIM
Location	Aliaga Plant, Turkey
Sizing	6" through 24"
Capacity	210,000 Sm ³ /h
Measurement	Turbine meters
Pressure	35 to 65 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2006, the Aliaga plant of Petkim Petrokimya was modernized with a new steam generating plant with HRSG and 56 MWe Alstom gas turbine. Together with Turkish manufacturing company Kalekalip A.S., iSystems designed and supplied the Metering and pressure reducing stations providing fuel gas to the boiler and turbine.

Scope of Work

Metering and Pressure Reducing stations for HRSG and Turbine, consisting of;

- Station inlet ESD ball valve, equipped with gas-over-oil actuator;
- 2 each Filtering sections, each with 2x 100% filters-liquid separators with quick-opening closures, and a Liquids Storage Tank for capturing the separated condensate;
- 2 each Flow metering sections, each with turbine meter and bypass line;
- 2 each Pressure reducing sections, each with 2x 100% pressure letdown streams, each with Shell & Tube heat exchangers for gas preheating. The pressure regulators are pilot-operated monitor/active devices, complemented by quick-acting slam-shut valves;
- Steam heating system to provide steam and hot water for the gas preheating heat exchangers;

2007 Turkgozu Border Metering Station

Quick Facts	
Year built	2007
Customer	METOT Ankara
End-user	BOTAS Pipeline Co.
Location	Turkgozu, Turkey
Sizing	18" through 42"
Capacity	900,000 Sm ³ /h
Measurement	Orifice meters
Pressure	50 to 60 barg
Material class	Carbon steel, ANSI specifications



Project Description

In parallel with the BTC (Baku-Tbilisi-Ceyhan) oil pipeline, the BTC consortium headed up by BP installed the SCP or Shah Deniz gas pipeline to connect Baku, Tbilisi and Erzurum to the world gas market. A Border Metering Station was constructed on the Turkish-Georgian border for the custody transfer of the gas to the BOTAS-operated portion of the pipeline in Turkey.

Scope of Work

iSystems were involved in the design and construction of the complete border metering station;

- Basic and detailed design of all piping systems within the metering station site boundaries, including a 42" slug catcher, inlet and outlet headers, filtering and flow metering modules including their interconnecting piping;
- Supply of 3 each 18" Cyclone Scrubbers with accessories and instruments;
- Supply of 3 each 20" dual-chamber orifice metering lines, complete with calibrated meter tubes and accessories;
- Complete detailed design and turnkey supply of a 12-meter long Analyzer and Transmitter Building, installed straddling the flow metering lines and holding the differential pressure, pressure and temperature transmitters for the orifice metering lines, as well as an extensive Gas Quality Analysis system consisting of: 2 each Process Gas Chromatographs, 2 each Sulphur Gas Chromatographs, 2 each Hydrocarbon Dewpoint meters, 2 each Moisture Analyzers and 2 each trace oxygen analyzers. The system was supplied complete with custom-built, extensive sample conditioning. The analyzer house was supplied complete with explosion-proof HVAC and pressurization system, fire & gas detection system and automatic fire-fighting system.
- Complete detailed design and turnkey supply of the Station Metering and Control Panel, holding 6 each flow computers, a DeltaV Control System, and a redundant PC-based Supervisory/HMI system.

2007 Qarn Alam Metering Station

Quick Facts	
Year built	2007
Customer	Bharat Heavy Electricals Ltd. (BHEL)
End-user	Petroleum Development Oman (PDO)
Location	Qarn Alam, Sultanate of Oman
Sizing	8"
Capacity	66,000 Sm ³ /h
Measurement	4-Path Ultrasonic meter
Pressure	30 to 95 barg
Material class	Carbon steel, ANSI specifications




Project Description

In 2007, Contractor BHEL constructed an open-cycle power plant in Qarn Alam, North Oman. iSystems supplied the GTP inlet metering skid.

Scope of Work

Design and supply of a 8" sized ultrasonic flow metering stream with bypass line and flow computer.

2007 Mukhaizna Metering Station

Quick Facts		
Year built	2007	
Customer	Bharat Heavy Electricals Ltd. (BHEL)	
End-user	Petroleum Development Oman (PDO)	
Location	Mukhaizna, Sultanate of Oman	
Sizing	12"	
Capacity	147,000 Sm ³ /h	
Measurement	2x 4-Path Ultrasonic meters	
Pressure	30 to 95 barg	
Material class	Carbon steel, ANSI specifications	

Project Description

In 2007, Contractor BHEL constructed an open-cycle power plant in Mukhaizna, South Oman. iSystems supplied the GTP inlet metering skid.

Scope of Work

Design and supply of the GTP inlet Custody Transfer Metering station, consisting of;

- Prefabricated metering skid with 2 each 12"-600# ultrasonic metering lines, complete with motor-operated stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- Analyzer shelter with 2 each C9+ Process Gas Chromatographs with sample takeoff and conditioning system;
- Station Control Panel with flow computers and PC-based Supervisory/HMI.

2007 Sohar Aluminium Smelter & Sohar GSS Expansion

Quick Facts		
Year built	2007	
Customer	Arabian Industries LLC (Sohar Aluminium) GALFAR (Sohar GSS Expansion)	
End-user	Oman Gas Company (OGC)	
Location	Sohar, Sultanate of Oman	
Sizing	2" through 10"	
Capacity	Up to 180,000 Sm ³ /h	
Measurement	Orifice meters and 4-Path Ultrasonic meters	
Pressure	30 to 95 barg	
Material class	Carbon steel, ANSI specifications	

Project Description

In 2007, the existing Sohar Gas Supply Station (GSS) was extended to provide natural gas to Sohar Aluminium Smelter (SAS), Aromatics Oman (AO), Sharq Sohar Steel Rolling Mills (SSSRM), SAPPF and SIS.

Scope of Work

Design and supply of the new Sohar GSS custody transfer metering stations, consisting of;

- For Aromatics Oman: prefabricated metering skid with 2 each 6" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- For SIS: prefabricated metering skid with 2 each 10" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;

- For SSSRM: prefabricated metering skid with 2 each 4" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- For SAPPF: prefabricated metering skid with 2 each 1.5" orifice metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring. Due to special requirements with regard to size and flow range, the orifice meters were not industry-standard items, but custom-designed and specially machined by iSystems.
- For SAS: prefabricated metering skid with 2 each 3" single-chamber orifice metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- 5 each (one for each metering station) Station Control Panels with flow computers and PC-based Supervisory/HMI.

2007 Barka Metering Station

Quick Facts	
Year built	2007
Customer	GPS / Punj Lloyd
End-user	Oman Gas Company (OGC)
Location	Barka, Sultanate of Oman
Sizing	16"
Capacity	Up to 330,000 Sm ³ /h
Measurement	2x 4-Path Ultrasonic meters
Pressure	30 to 95 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2007, the existing Barka Gas Supply Station (GSS) was extended to provide natural gas to Barka IWPP Power Plant, located 50 km to the west of Muscat.

Scope of Work

Design and supply of the new Barka GSS Train-2 custody transfer metering stations, consisting of;

- Prefabricated metering skid with 2 each 16" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2008 Buraimi Metering Station

Quick Facts	
Year built	2008
Customer	GPS
End-user	Oman Gas Company (OGC)
Location	Buraimi, Sultanate of Oman
Sizing	24"
Capacity	330,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	25 to 95 barg
Material class	Carbon steel, ANSI specifications



Project Description

Oman is connected to the Dolphin Pipeline, supplying gas from Qatar's North Field to Oman and the UAE. In Buraimi, a compressor station was built to boost the pressure of the natural gas supplied by Dolphin.

Scope of Work

Design and supply of the Buraimi CS gas import Custody Transfer Metering station;

- Prefabricated metering skid with 2 each 24" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, online densitometers and skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2008 Al Ghubrah Metering Station

Quick Facts	
Year built	2008
Customer	Arabian Industries LLC
End-user	Oman Gas Company (OGC)
Location	Al Ghubrah, Sultanate of Oman
Sizing	14"
Capacity	250,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	35 to 66 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2008 the Al Ghubrah Pressure Reduction Terminal in Muscat was expanded to cater for the gas supply to the Al Ghubrah power plant and desalination plant.

Scope of Work

Design and supply of the Al Ghubrah PRT Custody Transfer Metering station;

- Prefabricated metering skid with 2 each 14" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2008 OCTAL Metering and Pressure Reducing Station

Quick Facts	
Year built	2008
Customer	OCTAL
End-user	Oman Gas Company (OGC)
Location	Salalah, Sultanate of Oman
Sizing	3" through 6"
Capacity	13,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	30 to 35 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2008 the largest PET plant in the Middle East was commissioned for OCTAL Petrochemicals. The existing Sapphire GSS in Salalah was expanded to supply gas to the OCTAL plant.

Scope of Work

Design and supply of the OCTAL custody transfer metering and pressure reducing station;

- Prefabricated metering skid with 2 each 3” ultrasonic metering lines, complete with stream inlet & outlet valves and “Z”-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- Prefabricated pressure reduction skid with inlet ESD valve, and 2 each 100% pressure reducing lines, each with pilot-operated pressure regulator and full-capacity safety relief valve.
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2009 Wadi Jizzi Metering Station

Quick Facts	
Year built	2009
Customer	Arabian Industries LLC
End-user	Oman Gas Company (OGC)
Location	Wadi Jizzi, Sultanate of Oman
Sizing	12”
Capacity	125,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	18 to 23 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2009 the Wadi Jizzi Pressure Reduction Terminal in Muscat was expanded to cater for the gas supply to the Wadi Jizzi power plant.

Scope of Work

Design and supply of the Wadi Jizzi PRT Custody Transfer Metering station;

- Prefabricated metering skid with 2 each 12” ultrasonic metering lines, complete with stream inlet & outlet valves and “Z”-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2009 SAS Downstream Metering & Pressure Reducing Station

Quick Facts	
Year built	2009
Customer	Oman Gas Company (OGC)
End-user	Oman Gas Company (OGC)
Location	Sohar, Sultanate of Oman
Sizing	3” through 12”
Capacity	12,500 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	38 to 89 barg
Material class	Carbon steel, ANSI specifications



Project Description

In 2009 the Sohar Pressure Reduction Terminal in Muscat was expanded to cater for the gas supply to Sohar Aluminium Smelter downstream industries.

Scope of Work

Design and supply of the SAS Downstream custody transfer metering and pressure reducing station;

- Prefabricated metering skid with 2 each 3" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- Prefabricated pressure reduction skid with 2 each 100% pressure reducing lines, each with two ESD/slam-shut valves, two pilot-operated pressure regulators in monitor + active configuration, and a creep/relief valve.
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2009 Oman Cement Co. Metering Station

Quick Facts	
Year built	2009
Customer	GPS
End-user	Oman Gas Company (OGC)
Location	Rusayl, Sultanate of Oman
Sizing	6"
Capacity	50,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	54 to 63 barg
Material class	Carbon steel, ANSI specifications



Project Description

A new custody transfer metering station was added in Rusayl to cater for the increased gas demand of the Oman Cement factory.

Scope of Work

Design and supply of the Oman Cement Custody Transfer Metering station;

- Prefabricated metering skid with 2 each 6" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2009 Zwitina Power Plant Metering and Pressure Reducing Station

Quick Facts	
Year built	2009
Customer	ENKA Teknik A.S.
End-user	General Electric Co. of Libya (GECOL)
Location	Zwitina, Libya
Sizing	8" through 16"
Capacity	180,000 Sm ³ /h
Measurement	3x 4-path Ultrasonic meters
Pressure	30 to 50 barg
Material class	Carbon steel, ANSI specifications



Project Description

A new 2x 250 MW power plant was constructed in Zwitina, Libya.

Scope of Work

Design and project services and supply of equipment for the turbine fuelgas metering and pressure reducing station;

- Complete basic and detailed engineering of the complete fuelgas station, consisting of inlet- and outlet headers with ESD valves, inlet slug catcher, and 3 identical metering & pressure reducing system each containing a dry gas filter, shell & tube heat exchanger for gas preheating, ultrasonic flowmeter, slam-shut valve and pilot-operated pressure regulator.
- Supply of critical equipment and instruments, such as the ultrasonic flowmeters, slam-shut valves and pressure regulators, process gas chromatograph and other items.
- Design and turnkey supply of the main Station Control Panel with flow computers, redundant PLC-based station control system and redundant PC-based Supervisory/HMI.
- Miscellaneous project services such as procurement support, assistance for HAZOP and interface meetings, assistance during pre-commissioning and commissioning etc.

2010 VALE Metering Station

Quick Facts	
Year built	2010
Customer	Larsen & Toubro Electromech LLC
End-user	Oman Gas Company (OGC)
Location	Sultanate of Oman
Sizing	12"
Capacity	41,670 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters
Pressure	8 to 12 barg
Material class	Carbon steel, ANSI specifications



Project Description

A new iron or pellet plant is constructed 230 km southwest of Muscat for Brazilian mining company VALE.

Scope of Work

Design and supply of the VALE Custody Transfer Metering station;

- Prefabricated metering skid with 2 each 12" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- 2 each Process Gas Chromatographs with sample takeoff and conditioning;
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2010 PDO-BP Gas and Condensate Interface Metering Stations

Quick Facts	
Year built	2010
Customer	Petroleum Development Oman (PDO)
End-user	Petroleum Development Oman (PDO)
Location	Saih Rawl, Sultanate of Oman
Sizing	2" through 8"
Capacity	75 MMSCFD (natural gas, wet, sour) 150 m ³ /day (condensate) 150 m ³ /day (produced water)
Measurement	2x 4-path Ultrasonic meters (gas) 3x Coriolis meters (condensate & water)
Pressure	Up to 106 barg
Material class	Duplex stainless steel, ANSI specifications



Project Description

PDO have awarded BP Exploration Ltd. (Epsilon) the exploration and production sharing agreement for Block 61 (onshore) in the Sultanate of Oman with a commitment to appraise the gas reservoirs in the Khazzan and Makarem fields. In order to evacuate the produced gas, condensate and water from the Extended Well Test Facility, they will be exported to the Saih Rawl Central Processing Plant.

Scope of Work

Design and supply of the Custody Transfer Metering stations for natural gas and condensate, consisting of;

- Prefabricated gas metering skid with 2 each 8" ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring;
- 1 each Process Gas Chromatographs with sample takeoff and conditioning;
- Prefabricated condensate metering skid with 2 each 2" coriolis metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification, complete with instrumentation, skid cabling and wiring. The condensate metering skid is further complete with a BS&W metering section at the outlet.
- Loose supplied coriolis flowmeter for produced water.
- Station Control Panel with flow computers and redundant PC-based Supervisory/HMI.

2010 DCDP Sales Gas Metering Station

Quick Facts	
Year built	2010
Customer	Apache Energy Ltd.
End-user	Apache Energy Ltd.
Location	Devil Creek, West Australia
Sizing	10" through 20"
Capacity	260,000 Sm ³ /h
Measurement	2x 4-path Ultrasonic meters (gas)
Pressure	Up to 114 barg
Material class	Carbon steel, ANSI specifications



Project Description

The Devil Creek Development Project (DCDP) comprises a new gas treatment plant, receiving gas from the offshore Reindeer Field and supplying it into the Dampier-Bunbury Natural Gas Pipeline.

Scope of Work

iSystems is awarded, by Clough Projects Australia, the contract to supply the Sales Gas Metering station that will measure the gas supplied from the treatment plant to DBNGP. The system consists of;

- Prefabricated gas metering skid with 2 each 10"-900# ultrasonic metering lines, complete with stream inlet & outlet valves and "Z"-configuration piping for meter verification; complete with instrumentation, skid cabling & wiring. Each metering stream is equipped with a 2-stage filter/separator, flow control valve and check valve.
- 2 each Process Gas Chromatographs and 2 each moisture analyzers with sample takeoff and conditioning;
- Station Control Panel with flow computers, redundant DeltaV station control system and redundant PC-based Supervisory/HMI;
- The analyzers and station control panel are supplied installed inside a prefabricated Equipment Building, complete with air conditioning, fire detection system and other accessories.