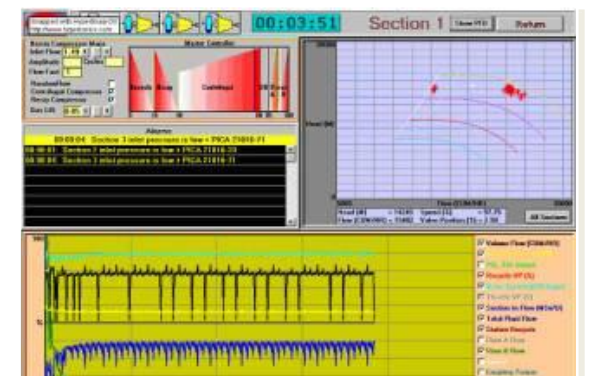


**MSE**













**MSE EXPERIENCE LIST  
SUMMARY  
2000 – 2011**











For further information please contact MSE (Consultants) Ltd  
Tel: +44 (0) 1372 700760 [info@mse.co.uk](mailto:info@mse.co.uk) [www.mse.co.uk](http://www.mse.co.uk)















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Year	Location	Asset	Client	Project	Project Description	Services Provided by MSE
2010	UK Offshore	Tartan		Tartan	Gas Lift Compression System Performance Monitoring	Weekly Compressor Performance Monitoring and Reporting of Compressors and Engines
2010	UK Offshore	Claymore		Claymore	Gas Lift Compression System Performance Monitoring	Weekly Compressor Performance Monitoring of Compressors and Engines
2010	Denmark	South Arne		HESS Denmark APS	HESS South Arne Compression Train Upgrade Study for Production Enhancement	LP Compression Train Upgrade
2010	Trinidad & Tobago	Hibiscus		BG Trinidad & Tobago	Hibiscus Compression Technical Evaluation	Technical Evaluation of Wellhead Compressor and Gas Turbine
2010	UK Offshore	Everest		Everest	Compressor Minimum Flow Study	Rewheel Design Study
2010	Azerbaijan	Azerbaijan		Flash Gas & Gas Export Compressor Surge and Recycle System Assurance Studies	AIOC Chirag Oil – Dynamic Simulation	Dynamic Simulation of Motor Driven Compressor Trains
2010	Peru	Camisea		Camisea	Field Development of Wellhead Compression – Conceptual Study of Three Condensate Field Clusters	Conceptual Study of Compression Options, Driver Option for Life of Field
2010	UK Offshore	BG Armada		Compression Capacity Study	BG Armada Compression Capacity Study	Compression Capacity Study – Debottlenecking Production Capacity Options
2010	UK Offshore	Brae		Marathon	Evaluation Study on East Brae; Export Compression	Rewheel Design and Compression Capacity Studies
2009	Denmark	South Arne		HESS Denmark APS	Compressor Rewheel investigation	Compressor Rewheel investigation for LP, MP and HP Compressors and Drivers
2009	UK Onshore	Bacton Storage		Bacton Storage Company Ltd	Compression Concept Design Study	Concept Design Study of Gas Storage Compression System
2009	UK Onshore	Lomond		Lomond	Compression Capacity Simulations for Lomond & Everest Facilities	Compression Capacity Simulations

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2009	UK Onshore	Centrica Storage	 Centrica	CSL Offshore Compression Performance Testing	Offshore Compression Performance Testing	Performance Testing and Analysis of Compressor Train, Gas Turbine and Process System
2009	UK Onshore	Hatfield West	 ScottishPower	Hatfield West Gas Storage Development	Deliverability Study of Gas Storage Facility using GASMAN™	Concept Design Study for Upgrading the Gas Compression Facility
2009	UK Offshore	Centrica Energy (HRL)	 Centrica	South Morecambe	Low Power & Ultimate Pressure Enhancement Study	Wellhead Pressure Enhancement
2009	UK Offshore	Claymore	 TALISMAN ENERGY	Claymore	Performance Monitoring	Weekly Compressor Performance Monitoring; Compressors and Gas Turbines
2009	UK Offshore	Triton FPSO	Wood Group	Triton Compressor Application	Rewheel Study	Modelling of existing and new duty using GASMAN™. New compressor impeller selection
2009	UK Offshore	Tartan	 TALISMAN ENERGY	Tartan	Dynamic modelling of start-up & transient cases for compression machinery	Compressor system transient analysis for start-up procedures and normal operation
2009	UK Offshore	Brae East	 MARATHON	Compression Study	LP Compressor Study	Compressor Design & Optimisation for Transporting 3 <sup>rd</sup> Party Gas
2009	Syria	Ebla	 Petrofac P	Dynamic Simulation Study	Transient analysis of new field and sales gas compression system models	Compressor system transient analysis. Dynamic Simulation of Gas Pipeline Compressor
2009	UK Offshore	Lomond	 bp	Consultancy Services	Consultancy Support Services	Consultancy Services for upgrade of Mid Life and Dense Phase Compressor
2008	UK Offshore	Everest	 bp	Reconfiguration & Rewheel Study	Compressor rewheel and revamp optimisation study including reservoir modelling for integrated asset simulations	Rewheel and revamp design study, production forecasting for different options
2008	UK Offshore	Gudrun Brae	 MARATHON	Compression Study	Study of Compression Options	Compressor design optimisation/modifications for transportation of 3 <sup>rd</sup> party gas














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2008	UK Offshore	Lomond		Rewheel Study	Rewheel design optimisation	Compressor rewheel Design & Audit of vendor proposal
2008	UK Offshore	South Morecambe		GASMAN™ Modifications	Modification and update of GASMAN™ model	Modification and update of proprietary software
2008	Egypt ENPPI -WDDM	Confidential		Confidential	Consultancy services	Consultancy services
2008	Pakistan	Mari-Habib Rahi		Concept Design Study	Field Development Study. Study of compression options for future production	Centrifugal and reciprocating compressor design, integrated field modelling for the life of the field
2008	UK Offshore	Brae Bravo		Compression Study	Third Party Gas Integration Compression	Compressor design optimisation/modifications
2008	UK Offshore	Beryl Bravo		Compression Revamp Study	Consultancy Services	Consultancy Services
2008	Confidential	Confidential		Compression Study	Confidential	Confidential
2007	UK Offshore	Brae Bravo		Audit & Compression Study	Selection Study for the export compression facilities	Compressor System Analysis at low pressure operation (LPO)
2007	Kazakhstan	Karachaganak		Dynamic Simulation	Dynamic Simulation study to model the effects of adding equipment to an existing plant	Compressor system transient analysis
2007	UK Offshore	Confidential		Compressor Testing	Commissioning & Performance Testing of Upgraded compression trains	Offshore Compressor Testing












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2007	Egypt	WDDM	 BG Group	Conceptual Design Study	Gas Reception Facility Compression Train Design Optimisation	Conceptual Design & Optimisation of Gas Compression System for Field Life
2007	UK Onshore	Hatfield Moor	 ScottishPower	Hatfield Moor Deliverability Study	Deliverability study of gas storage facility utilising GASMAN™	Gas Storage and Gas Deliverability study utilising GASMAN™
2007	UK	Lomond	 bp	Offshore testing of compression systems	Offshore testing of compression systems	Compressor testing
2007	UK	Britannia	 Britannia	GASMAN™ Modifications	Modification and update of GASMAN™ model	Modification and update of proprietary software
2007	Nigeria	Olokola LNG Plant	 BG Group	BG OKLNG	Consultancy services	Design Audit of LNG Compressor Trains. Consultancy services
2006	Kazakhstan	Karachaganak	 BG Group	Injection Compression Design Optimisation	Optimise compressor design for gas condensate field	Compressor design optimisation
2006	UK Offshore	Armada	 BG Group	Armada Export Compressor Revamp Study	Rewheel study of gas condensate field	Compressor design optimisation
2006	Australia	Pyrenees FPSO	 bhpbilliton	Solar Compressor Selection	Technical audit of aerodynamic selection for a solar compressor	Technical audit Compressor selection
2006	Tunisia	Miskar Field	 BG Group	Compressor Testing	Offshore compressor testing	Compressor testing
2006	Malaysia	F23	 Shell Global Solutions	Compressor Study	Concept design of new compression system utilising GASMAN™ software	Compressor concept design Proprietary software
2006	UK Onshore	South Morecambe	 centrica	Dynamic Simulation (Phase 2)	Dynamic simulation of onshore compression systems for a gas field	Dynamic simulation



















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Year	Location	Asset	Client	Project	Project Description	Services Provided by MSE
2006	Korea	Sakhalin	 	Dynamic Simulation (Phase II)	Transient analysis and surge control system study utilising GASMAN™ for a gas compressor station	Compressor system analysis Proprietary software
2006	Canada Newfoundland	FPSO - Sea Rose		Gas Turbine Performance Test	Gas turbine performance test of facility using MSE's turbine Test-bed	Turbine performance testing Proprietary software
2006	UK Offshore	Rough	 	Design Audit (Phase II)	Interchange piping configuration study and compression train upgrade	Design audit Compressor upgrade Configuration study
2006	UK	Lomond		Performance Assessment of Lomond Gas Compression Trains	Evaluation of the Lomond turbo machinery, including design, operating characteristics and field data, utilising CENTRIF & GASMAN™ software	Machinery design evaluation Proprietary software
2006	Australia	Pyrenees FPSO		Design Audit	Oil field centrifugal compressor design study	Compressor design audit
2006	Korea	Sakhalin	 	Dynamic Simulation (Phase I)	Transient analysis and surge control system study utilising GASMAN™ for a gas compressor station	Compressor system analysis Proprietary software
2006	Malaysia	Cakerawala	Carigali-Hess Operating Company	Booster Compression Study	Field deliverability and booster compression study	Compressor deliverability study

















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2006	UK	South Morecambe		Dynamic Simulation	Dynamic simulation of onshore facility	Dynamic simulation
2006	Japan	Yufutsu	Japan Petroleum Exploration Co. Ltd	Gas Cycling Pilot Plant and Survey	Gas cycling survey of HP compression	Compressor facility survey
2006	India	Mumbai High NQ		Asset Review	Asset analysis of existing machinery including design, performance and availability, plus investigations of options to increase compression capacity	Compressor asset investigation and analysis Facility optimisation
2006	UK	Britannia		Britannia GASMAN™ Model	Deliver GASMAN™ model and provide training	Proprietary software Staff training
2006	UK	South Morecambe		HRL GASMAN™ Licence and Maintenance	Deliver and maintain GASMAN™ model	Proprietary software
2006	Nigeria	Olokola LNG		Rotating Machinery Support	Confidential	Rotating machinery support
2006	UK Offshore	Rough	 	Upgrade Design Audit	Upgrade design audit of offshore facility	Facility design audit
2005	Kuala Lumpur	Cakerawala	Carigali-Hess Operating Company	Gas Compressor Screening Study	Determining booster compression methodology through screening study	Compressor screening study
2005	UK	South Morecambe		HP Rewheel 2006	Compressor redesign to optimise facility production	Compressor redesign

Year	Location	Asset	Client	Project	Project Description	Services Provided by MSE
2005	UK	Humbly Grove		Humbly Grove Booster Compressor Study	Design testing and procurement of three motor-driven compressors for gas storage facility	Compressor design testing Compressor Procurement
2005	Nigeria	Olokola LNG		Gas Compression Systems Audit	Evaluation of refrigeration compressors provided by M W Kellogg and Technip for LNG plant	Compressor FEED audit
2005	Thailand	Benchamas		Compression System Capacity Study (Phase II)	Field testing and design, including audit for the expansion of the oil production system as well as oil and gas production	Compressor field testing Compressor design audit
2005	UK	North Sea		Compression Optimisation Study (Phase II)	Offshore testing and design, including an audit of the oil and gas production facilities as well as the redesign for lower separator pressures for a gas and condensate field	Compressor offshore testing Design audit and redesign of oil and gas production facilities
2005	Oman	Saih Rawl		Facility Compressor Study	Upstream Gas Production for LNG Plant including wellhead compressor design, optimisation and driver selection	Compressor design and optimisation
2005	Thailand	Benchamas		Compression System Capacity Study	Field testing and design, plus audit and expansion of production system to optimise offshore oil and gas production	Compressor field testing Design audit
2005	Kazakhstan	Kashagan		Field Development Project	Dynamic simulation modelling of oil and gas, including separation, gas treatment, dewpoint control and export gas study for compressor trains	Dynamic simulation
2005	Malaysia	F23 Sarawak		Compressor Study	Simulation and testing of offshore gas facility and compressor study	Compressor offshore testing

Year	Location	Asset	Client	Project	Project Description	Services Provided by MSE
2005	UK	Britannia		Britannia Extension (Phase I)	Stage-by-stage analysis including offshore testing, design audit of oil and gas production facilities and redesign for lower separator pressures	Compressor offshore testing Design audit of production facilities Compressor redesign
2005	Oman	Zalzala		Compressor Design Study and Life Cycle Costing	Design of miscible injection of sour gas to 550bar for a high-pressure gas condensate field	Compressor design study
2005	UK	North Morecambe		Training Simulator	Real time training simulator for gas compression facility	Compressor real time training simulator
2005	India	Heera		ONGC Heera Asset	Road map for managing gas compression facilities on oil production platform	Offshore Survey of Production Facility Compressor Optimisation and Upgrade. Performance analysis and debottlenecking options
2005	UK	Humbly Grove		Testing of Gas Compressors	Performance and mechanical testing of gas compressors in the gas storage facility	Compressor performance and mechanical testing
2005	UK	North Morecambe		HP Rewheel Selection	Redesign of gas compression systems	Compressor re-configuration and Compressor redesign to achieve lower suction pressures
2005	Oman	Yibal/Fahud		Relocation of Oil Field's Compressor Train	Relocation of Yibal's gas compressor train C to Fahud F, including a feasibility study	Compressor redesign and feasibility study
2004	Confidential	Confidential		Confidential	Examination of operational scenarios for an ECP surge control line using GASMAN™ compression model	Compressor study



Year	Location	Asset	Client	Project	Project Description	Services Provided by MSE
2004	Mumbai, India	Mehsana		Compressor Workshop and Offshore Survey	Workshop for compressor design services and compression optimisation technologies	Compressor workshop
2004	UK North Sea	Britannia		Compression Capacity Study	Test machines and benchmark model as well as identify operational constraints and options to increase production of the gas condensate production platform	Compressor offshore testing
2004	Oman	Zalzala		Injection Compressor Design Study	Construct GASMAN™ model of compression system in order to design and optimise compressors for a high-pressure gas condensate field	Compressor redesign
2004	UK	North Morecambe		Dynamic Simulation Study	Construct dynamic simulation model of compression train when converted from parallel to series configuration as well as design and optimise the control system	Dynamic simulation Compressor control system design and optimisation
2004	UK	Armada		Deliverability and Production Plan Technical Audit	Construct GASMAN™ model of compression trains when converted from parallel to series configuration as well as design and optimise control system for a gas condensate field	Design and optimisation of control system Proprietary software
2004	UK Offshore	Rough		Injection Phase I Enhancement	Concept study for increased injection rates with compressor rewheels and turbine upgrades	Integrated modelling, machinery concept and detailed designs
2004	Confidential	Confidential	Parsons Fluor Daniel	Gas Compressor Investigation	Development of high pressure gas seals to 750bar for a gas injection field	Development of high-pressure gas seals
2004	Confidential	Confidential	Confidential	Gas Storage Project	Construct GASMAN™ model of asset, including field process and compression facilities as well as optimise design and operations	Proprietary software Compressor design optimisation

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2004	UK North Sea	Heather		Compressor Investigation	Gas lift compressor investigation of poor availability performance, including benchmarking, analysis of and design for protecting future availability with new demands of the oil production facility and integration of satellite field	Compressor analysis, benchmarking and redesign
2004	Numerous			Joint Industry Project	Joint Industry Project extension with new assets – extension and growth of the wellhead compressor database. Launch of CompressorNet (an Internet tool-kit for compressor analysis)	Online facility for compressor analysis
2004	Numerous			Joint Industry Project	Joint Industry Project extension with new assets – extension and growth of the wellhead compressor database. Launch of CompressorNet (an Internet tool-kit for compressor analysis)	Online facility for compressor analysis
2004	Gujarat, India			Technical Audit	Technical audit of a reciprocating compressor for a gas transmission facility	Compressor technical audit
2003	Oman	Yibal		Wellhead Compression Analysis	Optimisation of compression system and configuration for new field gas field demands using GASMAN™ model	Compression system optimisation New field demand configuration Proprietary software
2003	UK North Sea			Control System Optimisation	Control system optimisation of the control system for new gas compositions and process conditions to improve oil field availability	Compressor control system optimisation
2003	Oman	Lekhwair		Compression Study	System performance investigation, using GASMAN™, of four-stage compression system to enhance oil field production	Compressor performance investigation study Proprietary software
2003	ConocoPhillips	Britannia		BLP MP Compressor Study	Compressor study to optimise gas condensate field compressor specifications and integrate with existing production system using GASMAN™ model	Compressor integration and optimisation Proprietary software

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2003	UK Irish Sea	South Morecambe		Offshore and Onshore Rewheel Study	Offshore and onshore Rewheel study to optimise compressor specifications and maximise production system deliverability, using GASMAN™ model for a gas field	Compressor optimisation Proprietary software
2003	UK Irish Sea	Liverpool Bay		Oil and Gas Field Feasibility Study	Feasibility study of gas storage facility in order to verify concept design and evaluate project risks for oil and gas field	Compressor feasibility study
2003	Oman	Lekhwar		Oil Field's Compressor Performance Analysis	Compressor performance benchmark visit to site in order to calculate current machine performance and oil field's production system constraints	Compressor performance analysis
2003	UK	Rough Field		Facility Inspection	Confidential	Facility assessment
2003	Europe			White Rose Factory Acceptance Visits	Witness factory test for gas turbines, pumps and swivel joints for FPSO	Gas turbine factory acceptance test Factory visit
2003	UK North Sea	Thistle		Investigation of Thistle's Compressor Performance	Gas lift compressor performance investigation to enhance machine availability for oil field	Compressor performance investigation
2003	Australia			Gas Field Operations Compressor Study	Compressor study of gas field operations to review suitability for new field duties	Compressor review
2003	Oman	Harweel		Gas Condensate Field Compressor Study	Compressor study to produce a field development plan and compression system configuration for a new high pressure field, using GASMAN™ model	Compressor study Gas field development plan Compression system configuration Proprietary software










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2003	N/A			Gas Turbine Evaluation	Gas turbine evaluation of manufacturer's new products for increased power range	Gas turbine evaluation
2003	Confidential		Confidential	LNG Compressor Reconfiguration Study	Development and optimisation of LNG compressor system to maximise availability	Compressor reconfiguration study System optimisation
2002	Algeria	(Amerada) El-Gasso		Injection Gas Compression System Requirements	Specification of an injection gas compression system for a gas condensate field	Gas compression system requirements specification
2002	UK Irish Sea	North Morecambe		Redesign Gas Compression System	Redesign compression system to optimise gas field deliverability, integrating modifications into existing plan using GASMAN™	Compressor redesign Proprietary software
2002	UK Irish Sea	Liverpool Bay		Booster Compression Evaluation	Booster compression evaluation using GASMAN™ compression model to optimise specifications and maximise production of the oil and gas field	Compressor analysis and optimisation Proprietary software
2002	Confidential	Confidential	Confidential	LNG	Consultancy service to evaluate risks in contractors FEED and design audit of field contractor including the federation compressors	Compressor design audit FEED risk evaluation
2002	Numerous			JIP - Pointing To The Optimisation of Centrifugal Compressors for Hydrocarbon Gas Processors	To conduct a survey of up to 100 centrifugal compressors and evaluate real performance, to identify best and worst performing units, to derive a database and design guidelines	Database of centrifugal compressors' performance












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2002	Numerous			JIP - Pointing To The Optimisation of Centrifugal Compressors for Hydrocarbon Gas Processors	To conduct a survey of up to 100 centrifugal compressors and evaluate real performance, to identify best and worst performing units, to derive a database and design guidelines	Database of centrifugal compressors' performance
2002	Numerous			JIP - Pointing To The Optimisation of Centrifugal Compressors for Hydrocarbon Gas Processors	To conduct a survey of up to 100 centrifugal compressors and evaluate real performance, to identify best and worst performing units, to derive a database and design guidelines	Database of centrifugal compressors' performance
2002	Numerous			JIP - Pointing To The Optimisation of Centrifugal Compressors for Hydrocarbon Gas Processors	To conduct a survey of up to 100 centrifugal compressors and evaluate real performance, to identify best and worst performing units, to derive a database and design guidelines	Database of centrifugal compressors' performance
2002	UK North Sea	Elgin Franklin		Gas Turbine Emission Study	To reconcile measured emissions with compression system load and fuel gas composition and produce a modelling technique for calculating emissions	Produce modelling technique to calculate and reconcile gas turbine emissions
2002	Saudi Arabia	Haradh		Dynamic Simulation Study	Dynamic simulation study of a two-stage series gas compression system for an oil field	Dynamic simulation study
2002	Tunisia	Mediterranean Sea Miskar		Compressor Bid Evaluation	Compressor bid evaluation to review the merits and risks of compression proposals for a new gas field development	Compressor bid evaluation
2001	UK Irish Sea	South Morecambe		GASMAN™ Training	GASMAN™ training of HRL personnel using Control Room GASMAN™ to calculate control set points for operations	Proprietary software training





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2001	UK North Sea	Brent	 Shell Expro Ltd	Compressor Reconfiguration Study	Produce future field development plan to blow-down the gas cap, using GASMAN™ model for the Brent Platforms	Produce future field development plan utilising proprietary software
2001	UK Irish Sea	Liverpool Bay		Liverpool Bay Field System Process Design	Refrigeration system process design and specification to dew point gas prior to export, using HYSYS model and GASMAN™ model for the oil and gas field	Process design model Proprietary software
2001	UK North Sea	Indefatigable		Gas Compression System Investigation	Gas compression system investigation to evaluate six-stage compression capacity and de-bottleneck performance	Gas compression system investigation
2001	UK Irish Sea	South Morecambe		Upgrade of GASMAN™	Upgrade of GASMAN™ gas field model to include onshore compression	Upgrade of proprietary software
2001	UK Irish Sea	Liverpool Bay		Compressor System Study	Compressor system optimisation and reconfiguration for export and Offgas compressors to meet future field demands, using GASMAN™ model	Compressor system optimisation and reconfiguration Proprietary software
2001	Tunisia	Mediterranean Sea Miskar		Compression System Study	Compression system study to optimise the compression system configuration for maximum availability for gas field	Compression system study Optimisation of compression system
2000	Confidential			Gas Explorer Scoping Study	Gas Explorer scoping study to optimise the compression requirements and number of wells	Scoping study Compression requirements optimisation
2000	N/A			FPSO Concept Design Study	Concept design study for a gas storage ship	Concept design
2000	Holland	Markham		Gas Compression System Investigation	Gas compression system investigation to benchmark performance of a four-stage system and de-bottleneck production	Gas compression system investigation



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2000	UK Irish Sea	South Morecambe		Upgrade GASMAN™ Model	Upgrade GASMAN™ model to align with current gas field operation and new compressor impeller configuration	Upgrade proprietary software for new compressor operating configurations
2000	Holland	Markham		Compressor System Testing and Performance Investigation	System testing and performance investigations of offshore compressor	Offshore compressor system testing and performance investigation