



Martin Barnes

HUMAN FACTORS ENGINEERING, WORKING ENVIRONMENT AND SPECIALIST DESIGN SERVICES

CAREER SUMMARY

I have over 27 years working experience as a consultant in safety critical industries across the globe. Throughout this period I have been offering specialist design solutions, Human Factors Engineering, Working Environment Engineering and project management expertise aimed at optimizing efficiency, effectiveness and safety whilst minimizing the potential human error and reducing both CAPEX and OPEX costs. I apply a practical approach aimed at assisting engineering teams and facilities management in the delivery of complex sociotechnical systems.

I have been the Principal Discipline Lead on a significant number of major CAPEX projects across industry. Experienced in managing large HFE teams having overall discipline technical responsibility on numerous international projects and holding pivotal coordination roles in large multi discipline teams (200+ engineers). Working experience not only in project design phases through to implementation but also operations in the field with responsibilities in assessing health and safety protection systems, procedures; risk identification, reduction and mitigation; competency and training with the overall aim of reducing OPEX costs through improvement in safety, risk reduction, task time reduction and reduction in human error resulting in the **continuity of operations**.

Human Factors Engineering/ Working Environment

I have a detailed understanding and extensive experience in the application of industry regulatory, national, international, governing bodies and corporate governance (ISO, HSE, NORSOK, API, IOGP, EI, OHS, AS, EEMUA, PSA, ASTM, DOE, DOT, ABS, ISA etc.). Experienced in the identification, analysis and assessment of risks (safety, health and working environment hazards) by employing industry recognised structured 'user led' and 'task based' processes allowing for the engineering of hazard controls at the earliest point in the design process. The application of ALARP and SWIFT processes ensure that the appropriate measures are engineered into the design in response to the identified risk. Development and analysis of procedures to ensure safe working practice and to identify and to mitigate against the potential for human error.

Experienced in 3D model reviews and software navigation (incl. 3D PDMS) using a detailed understanding in the reading of P&IDs and PFDs to assist in valve, equipment and instrumentation identification and assessment including sequence of task and functional adjacency. Ability to read P&IDs allows for the quick identification of safety protection devices and areas of potential concern in the model during review fly through. In addition 20 years daily working experience with CAD packages, such as AutoCAD, ensures an awareness of the human scale within drawings and models.

Control Facility Design

During the last 27 years I have specialised in the detailed design of safety critical control facilities and operational environments with the purpose of optimising efficiency, effectiveness, safety, satisfaction and staff well-being. These have ranged from single occupant control environments through to highly complex centralised control facilities with 70+ rooms. I have worked on projects throughout the design lifecycle from the identification of user requirements through to implementation and client handover.

My interest and detailed knowledge extends beyond the methodologies, guidance and performance criteria contained within governance such as ISO 11064. I understand QRA outputs and the consequent implications on the physical building design and the detection and protection systems required to protect both personnel and assets, ensuring the continuity of safe operations. I keep up to date with research and technology

developments to ensure the working environment promotes operator vigilance and alertness throughout the 24-hour operating cycle.

To ensure that all operator and operational needs are clearly identified and met I employ industry recognised user led approaches such as that described in ISO 11064 Part 1. This robust approach has been applied on over 200 control rooms across industry worldwide, providing me with highly refined skill sets and an extensive technical knowledge base. This ensures that the project is right first time, no costly rework and associated project delays. I strive to provide cost effective solutions often within challenging timescales. I have a comprehensive understanding of industry, corporate and regulatory governance as well as international standards and industry best practice.

With over 20 years CAD experience and an industrial design background I interact with the project discipline engineers in a manner that they understand. I provide detailed engineering design solutions with detailed material and product specifications. This results in real tangible design packages from which materials can be procured and designs built. There is no need for further project design interpretation of the technical ergonomic, human factors and risk protection requirement or intent, it is in the design provided. This ensures a true and immediate human factors integration process with minimal design review stage gates, reducing both project costs and timescales.

In addition I have extended work experience in the operational field supporting the transition from a multi point localised PLC control over to a remote centralised SCADA control operation. This involved a change in the operations culture and procedures from a board level down.

KEY SKILLS

- HFE support to the HAZID, HAZOP and ALARP processes;
- HFE Support to 3D Model Reviews – 3D PDMS etc.;
- HFE Screening – HFE risk assessment and prioritisation;
- Valve Criticality Analysis/ Instrument Criticality Analysis;
- Identification of/ mitigation against the potential for human error;
- Detailed understanding of industry regulatory, national, international, governing bodies and corporate governance and established/ emerging best practice – ISO, HSE, NORSOK, API, IOGP, EI, OHS, AS, EEMUA, PSA, ASTM, DOE, DOT, ABS, ISA etc.;
- Task Analysis, Safety Critical Task Analysis, Link Analysis, Comms Link Analysis, Functional Adjacency etc.;
- Operational procedure review for safety critical industries;
- Alarm Management/ Prioritisation/ Rationalisation – EEMUA 191, ISA 18.2.
- HMI/ HCI design – hardwired and screen based – PLC, SCADA, DCS, ICSS;
- Labelling, signage, way finding design/ assessment;
- Emergency escape routing design/ assessment.
- Workspace design assessments;
- Managing user groups, client representatives, professionals and contractors;
- Concept Design - Production of User Requirement Specifications and Front End Engineering Design Briefs;
- Technical writing - HFE corporate governance;
- Design and running of user/ project technical workshops;
- Headquarters organizational design, user requirements, space allocation, department association/ link analysis and space planning;
- Procedural review/ writing;
- Operational change management;
- Technical Authority review/ HFE QA/ QC, Tender review/ Proposal writing.
- Development of Basis of Design – User Requirements documentation;
- CCF/ CR detailed design specialist – CAD literate (in excess of 200 safety critical working environments);
- 24 hour working environment design;
- HFE working environment assessment;
- Specialist lighting detailed design;
- CR workstation detailed design specialist;
- Specialist ergonomic furniture/ product assessments;
- Specialist control room product specification, selection and evaluation;
- Control room operations/ processes – HFE review/ assessment;
- Project management of CCR installations;
- Site security system integration - design and installation project management.

EXPERIENCE

Human Integration Limited – April 2012 – Present

April 2014 – April 2015

RDS (AKER Solutions) - Working Environment (WE) Engineer (Human Factors Engineering (HFE) Support)

Providing WE Engineer and HFE support services on the Drilling Platform of the Statoil Johan Sverdrup Project (located in the North Sea – Norwegian Sector) during the FEED and POST-FEED design phase. Working to PSA, NORSOK, TR etc. governance

January 2014 – April 2014

TATWEER Petroleum - HFE and Specialist Design Services

Providing HFE and detailed design services for the field Centralised Control Room and operations Enhanced Oil Recovery in the Awali Oil Field.

July 2013 – December 2013

CB&I – HFE and WE Engineer

Providing HFE and WE Engineering services to the Statoil Bressay Project (located in the North Sea – UK Sector) during the POST-FEED (Pre Engineering) design phase. Working to HSE, NORSOK, TR etc. governance.

October 2012 – April 2013

ICHTHYS LNG CPF TOPSIDES - HF Engineer

HFE Specialist to the Detailed Design Phase of the Ichthys LNG CPF Topsides Project; the largest semi-submersible platform to date. The position is a full time secondment into the client's engineering offices in Houston, providing HFE support to both our client and other stakeholders. The key responsibilities are to ensure that HFE requirements and principals are incorporated into the design of the CPF to create safe working environments, achieve efficiencies in CAPEX and OPEX costs and ensure the potential risks for human error are clearly identified and mitigated against in the design.

Key HFE activities completed on this project include, but are not limited to:

- Development and execution of the Human Factors Implementation Plan to ensure full integration of HFE into project;
- Developing and delivering HFE Awareness Training to project engineering teams and project management;
- Completing the HFE Screening of all Vendor Supplied Equipment with engineering disciplines and Operations representatives to ensure HFE risk assessment and prioritisation;
- Providing HFE support to the selection, evaluation and design of Vendor supplied equipment, skids and packages through HFE reviews of proposals, documentation and general arrangements, as well as HFE support during Vendor Bid Clarification Meetings, Kick-Off Meetings and detailed design HFE reviews;
- Valve Criticality Analysis (VCA);
- Instrument Criticality Analysis (ICA);
- Design of the 'HFE Quick Reference Tool' to be used by project Engineers/ Designers. This tool provides an accessible breakdown of project HFE requirements, key anthropometric data and HFE questions for consideration during design;
- HFE support to project and Vendor 3D model reviews;
- HFE support to the HAZID, HAZOP and ALARP processes;
- Development of the Integration of HFE into the HAZOP process – 'Structured What-If Technique';
- Procedural review against proposed design to ensure that operational interfaces are clear and intuitive;
- Task Analysis and Safety Critical Task Analysis;
- Human Error Identification and Human Reliability Assessment;
- Procedural analysis;
- Design of engineering solutions to mitigate against the potential for human error risks identified.

April 2012 – October 2012

TATWEER Petroleum - Human Factors Engineer (HFE) and Specialist Design Services

I was working for TATWEER Petroleum (TP) on an Enhanced Oil Recovery project in Bahrain (Awali Field) providing HFE expertise project wide. Tasks included control room design, organisational design/ rationalisation, facility site identification, assessment/ optimisation, HMI/ HCI screen page and navigation design, workspace evaluation, manual handling, advice on safe working practices, reviewing operational procedures, alarm rationalisation/ management, QRA reviews and advice on mitigation measures, identification of the potential for human error, HFE risk assessments, vendor package review, input into bid documentation, tender evaluations, equipment room design, review of labelling/ tagging protocols and review and advise on company governance.

EMPLOYED CONSULTANT – October 1988 - April 2012

PRINCIPAL CONSULTANT - TEAM MANAGER, ATKINS LTD, LONDON, UK — 2008-2012

I was approached by Atkins to develop a design solution capability with the Rail Human Factors/ Ergonomics team as a Principal Consultant based out of the Euston Tower office in central London. At the beginning of 2010, I was promoted to Business Unit Team Leader and I successfully moved the business into Energy, Oil and Gas after personally winning a single global 5 year Master Services Agreement (MSA) with Shell to provide mandatory HFE support to major CAPEX projects (over USD100M). Approximate CAPEX on major project equates to USD30BN per annum.

PRINCIPAL CONSULTANT, VECTRA ARCADIS LTD, WARRINGTON, UK — 2005-2008

I re-joined Vectra Arcadis Ltd with similar roles and responsibilities to those held at EMS LTD. During this period I was primarily embedded into large engineering design teams on major CAPEX projects as discipline lead or sole working specialist in the US, the Middle East and London.

PRINCIPAL CONSULTANT, EMS LTD, WARRINGTON, UK — 2004-2005

The establishment of EMS LTD resulted from a management split at Vectra LTD prompted by the company being put onto the market. My role as Principal Consultant was to develop market presence, deliver technical work, project management and to build the Human Factors/ Design Solutions Team.

SENIOR CONSULTANT, AMEY VECTRA LTD (LATER VECTRA LTD), WARRINGTON, UK — 2001-2004

At AMEY Vectra I continued the work developed at TRD. Additional market presence and commercial support allowed for an expansion into new international markets.

ASSOCIATE DIRECTOR, TOWNEND RYDER DESIGNERS (TRD) LTD, LONDON, UK — 1988-2001

I joined the company at an early stage in its development as a Graduate. The company started to develop a niche market presence in providing specialist design solutions to safety critical industries with a bias towards the downstream/ upstream Oil and Gas market sector. Within a year this market had grown to almost 100% of the company's activity. I was instrumental in the development and refining of our offer to market. I was promoted to associate director within five years. The company was acquired by AMEY Vectra LTD in 2001.

EDUCATION

B/TEC Diploma Three Dimensional Product Design - West Sussex College of Design, England
BA (Hons) Furniture & Related Product Design (Industrial Design) - Kingston University, London

SELECTED SAFETY CRITICAL PROJECTS

OIL AND GAS

- **RDS (AKER Solutions)** - Working Environment (WE) Specialist to the FEED Phase and POST-FEED Phase of the Drilling Platform - Statoil Johan Sverdrup Project, London, UK;
- **CB&I** - HFE/ WE Specialist to the Pre Engineering Phase of the Statoil Bressay Project, London, UK;
- **Mustang Engineering Inc** – HFE Specialist to the Detailed Design Phase of the Ichthys LNG CPF Topsides Project, Houston, Texas, USA;
- **Tatweer Petroleum** – Human Factors Consultant EOR, Awali Oil Field, Bahrain;
- **Tatweer Petroleum** – Specialist Design of new Central Control Facility, Awali Oil Field, Bahrain;
- **Shell** Human Factors Engineering (HFE) in Major Projects Governance (O&G);
- **Shell** Development of Fatigue Awareness, Mitigation and Management (O&G);
- **Shell** Development of Workspace Environment Design Governance (O&G);
- **Shell** Pernis CR11 – New Control Room Design;
- **Shell** Development of Workload Assessment Tool for Oil Movement Control Operations, Houston, Texas;
- **BP** Wytch Farm – COMAH Safety Case Support – Central Control Room;
- **Mustang Tampa** Principal Consultant/ Project Manager TAKREER (UAE) Green Diesel Project, Centralised Control Building Design, Ruwais Refinery, UAE;
- **Perenco** Principal Consultant/Project Manager Conceptual/Front End Design for Southern Gas Field Control Room, Bacton & Great Yarmouth, Norfolk;
- **Shell** Senior Designer for Shell's first UK Centralised Control Room for total refinery operations, Shell Haven Refinery, UK;
- **Shell** Revamped Crude Distillation Unit control room for Shell UK. (The complete project was carried out without a shutdown) Stanlow, UK;
- **Shell** New Rail Loading Control Building for remote loading of normal Aviation and High Octane Jet Fuel, Shell Stanlow, UK;
- **Shell** - Power Station and Utilities Control Room, Shell Stanlow, UK;
- **BP** - Conceptual and detail design for the North Sea Oil Control Room, Sullom Voe for BP Oil;
- **Elf Oil** - Centralised Control Room for Elf Oil UK at Milford Haven;
- **Shell** - Additives and Intermediates Control Room Shell Stanlow;
- **Elf Oil** - Conceptual design and brief for detail design of a New Refinery Control Building for Elf Oil near Leuna, Germany;
- **Shell** - Conceptual design for Northern Gas Field Control Room, St. Fergus, Scotland;
- **Mobile Oil** - Conceptual Design and Brief for Detail Design of a Centralised Control Building and gate house/ site entrance complex for Mobil Oil at Coryton, Essex;
- **Shell** - Conceptual design, detail design and project supervision for Southern Gas Field Control Room, Bacton, Norfolk for Shell UK Exploration & Production;
- **Shell** - Cracker Control Room Lighting Refurbishment, Shell Stanlow;
- **Shell** - Centralised Control Room (Alcohol's & Solvents Production) for Shell UK Stanlow;
- **Shell** - Review of vessel control room operations ergonomics/ human factors and design advice for new 3,000,000 tonne 'Bonga' FPSO for Shell NEPCo, AMEC and Foxboro;
- **Shell** Detailed design of Site Security Project for Shell UK at Stanlow Oil Refinery (whole site);
- **BP** Access Control and Site Security Project for BP Oil Grangemouth (whole site);
- **Nynas** Access Control and Site Security Project (whole site).

CHEMICALS

- **BP** - Conceptual design, detail design and supervision for Power Station revamp for BP Chemicals;
- **Brunner Mond** - Business accommodation and control point relocation: feasibility/ planning/ project management;
- **Zeneca** - Security control room design for Control Room at Alderley Park, Cheshire;
- **Courtaulds Chemicals** - Centralised Control Room study, Spondon, Derbyshire;
- **Rhone Poulenc** - Conceptual and detail design together with project supervisory role FA CCR, Avonmouth;
- **ICI** - Control room feasibility and design package for HF3 Centralised Control Room, ICI C&P, Rocksavage Works (forming the basis for a further 13 control room upgrades);
- **Brunner Mond** - Centralised Control Room, Winnington Site, Northwich;

- **Montell Chemicals** - Refurbishment of Site Emergency Control Centre, Fire & Security Control Room, Carrington, Manchester;
- **Merck Sharp & Dohme** - Design Team leader for New Process Building for Pharmaceutical (medical drug production), London;
- **ICI** - Four security gatehouses and a Centralised Fire and Safety Control Room at ICI Wilton.

NUCLEAR POWER GENERATION

- **BNFL** - Refurbishment of Centralised Control Room, Thorp (Sellafield, Cumbria);
- **BNFL Magnox** - Relocation of Emergency Control Centre Sizewell A Nuclear Power Station for BNFL Magnox Generation;
- **BNFL Magnox** - Redesign of Control Room Supervisor's Desk Sizewell A Nuclear Power Station for BNFL Magnox Generation;
- **Nuclear Electric** - Centralised Control Room refurbishment, Hinkley B Power Station, Somerset;
- **BNFL** - Design Team leader for refurbishment of FHP (Fuel Handling Plant) control room. BNFL Sellafield, Cumbria;
- **BNFL** - Conceptual design study to integrate Line 3 WVP control interface into existing Line 1& 2 Control Room and to upgrade "active side" control room environment;
- **BNFL** - Detail design package for Refurbishment of WVP Process Control Room, Waste Management Facility, BNFL Sellafield, Cumbria.

TRANSPORTATION

- **Network Rail UK** - North London Rail Infrastructure Programme (NLRIP) Angel Lane – Design GRIP Stages 5-8 - Liverpool St IECC Signalling Control Centre - Principal Consultant;
- **MTR Hong Kong** - SCL C1106 HUH Station Design - Principal Consultant;
- **Chiltern Railways UK** - Evergreen 3 – Marylebone IECC Signalling Control Centre, Design GRIP Stages 3-5 - Principal Consultant;
- **Network Rail UK** - NLRIP – Upminster IECC Signalling Control Room, Design GRIP Stages 5-8 - Principal Consultant;
- **MTR Hong Kong** - South Island Line (SIL) Station Design - Principal Consultant;
- **Network Rail UK** - Ashford Depot Shunters Cabin Design, Design GRIP Stages 5-8;
- **Network Rail UK** - Eastleigh PSB – Southampton Re Interlocking, Design GRIP Stage 3 - Principal Consultant;
- **Network Rail UK** - Moorthorpe Re-Signalling, Design GRIP Stage 4 - Principal Consultant;
- **Tube Lines Limited** - Cooling the Tube – 'Blue Light' Platform Cooling Study - Lead Consultant, Design Team Leader and Coordinator;
- **Tube Lines Limited** - Cooling the Tube – Evaporative Cooling Systems at Colliers Wood LU Station - Senior Consultant/Project Manager;
- **Tube Lines Limited** - Canada Water – 4 Hour fire segregation of station. 55 metric tonne structure design load/co-ordinator - Lead Consultant, Design Team Leader and Coordinator;
- **Tube Lines Limited** - Canada Water – Lead Consultant on with Exit 2 Air Velocity Study - Lead Consultant, Design Team Leader and Coordinator;
- **Tube Lines Limited** - Cooling The Tube – Lead Consultant on 8000 – 17000K High colour temperature platform lighting trials - Lead Consultant, Design Team Leader and Coordinator;
- **Network Rail UK** - Thameslink 2000 – support for Human Systems Engineering group providing conceptual and detail design support for New London City Rail Control Centre - Design Lead for Control Room Layout;
- **Network Rail UK** - Design reports, design proposals & detailed design for WCRM Signalling Control Centres (new build at Rugby SCC, upgrades Bletchley SB, and Stoke SCC) for GE Transportation as part of the Interim Control Points Alliance - Design Lead for Control Room, Workstation and Video Wall Up-grade;
- **Tube Lines Limited** - Ergonomic/Anthropometric Assessment of the Proposed Station Control Facility Desks for 11 London Underground Stations - Design Lead;
- **Tube Lines Limited** - Detailed Design of the Station Control Facility Desk at Arnos Grove London Underground Station - Design Lead;
- **Greater Western & Thameslink/ GN Franchise** - Review/Report on the existing security measures/procedures and recommendations/ costings for future operations for one of the bidders - Specialist Consultant;
- **Nexus** - Tyne & Wear Metro - Senior Designer for Replacement Control Room Study, Newcastle - Design Lead;

- **Chiltern Railways** - Conceptual design and detail design of New ICC (Integrated Control Centre) - Design Lead, Project Manager and coordinator;
- **AMEY Rail** - Design and Implementation Plan for New Control Centre, Birmingham - Design Lead, Project Manager and coordinator;
- **Tube Lines Limited** - Senior Consultant – Cooling the Tube – HF & Safety Case Support for the Air Handling Unit Trials at Charing Cross Station - Design Lead, Project Manager and coordinator;
- **Tube Lines Limited** - Redesign of Existing Security Control Room & Associated System Integration at Stratford LU Station - Senior Consultant/Project Manager.