Process & Piping Design
 Structural Design Services
 Electrical & Instrumentation Services
 Surveying & 3D Laser Scanning
 CAD Draughting Services & Manpower
 Training Courses
Welcome to this introduction to ENG-CAD Limited, one of the UK’s fastest-growing independent Design and Project Management consultancies.

Specialising in servicing the Offshore, Petrochemical, Nuclear, Public Utility and Renewable Energy sectors, Eng-Cad are a multi-disciplined team of experienced Engineers and Designers who have established a substantial portfolio of clients in the Petrochemical and Energy Generation sectors, as well as an enviable reputation for transparent and cost effective engineering solutions.

Working with other leading engineering professionals, we resolve our clients’ engineering challenges, producing innovative designs of high quality.

Eng-Cad is an Engineering Design Consultancy that provides engineering support services that include but are not limited to, Process and Piping, Electrical Control and Instrumentation, Structural Steelwork design and carry out both engineering and building surveys.

Thanks to our extensive use of the latest technologies and our flexible workforce we are able to minimise our overheads, enabling the provision of the highest quality services at extremely competitive prices.

Eng-Cad’s highly experienced multi-disciplined resource base, enables the benefits of our “Can-Do” philosophy to be enjoyed by and shared with our clients and partners, across a substantial range of integrated technical challenges from Conceptual Design through to final as-built survey and record documentation.

If you don’t see what you are looking for, please feel free to contact us and ask for further details either by phone or at enquiries@eng-cad.com.

Thank you for your time today, we look forward to hearing from you.
In conjunction with Eng-Cad’s extensive quality approved list of multi-discipline construction partners, we are able to provide full turn-key solutions to resolve our client’s Structural, Process/Piping or E&I requirements for any complete or part project for which a defined work-scope can be identified.

By taking responsibility for the entire project in this manner, we are able to provide seamless coordination of the design and fabrication process, utilising the full range of our technical, engineering, construction and associated support skills to minimise both commercial and technical risk and to realise full design optimisation for any dedicated project.

Services covered include (but are not limited to):-

- Feasibility Studies
- Site Surveys
- Conceptual Design
- Quantity Surveying / Cost Engineering
- Procurement
- Project Management Work Packs/CTR’s/Method Statements and Risk Assessments
- Construction and Installation Supervision
- As-Built Survey and Drawing updates
- Close Out packages
ENGINEERING SERVICES

PERSONNEL RESOURCE SOLUTIONS

Eng-Cad are able to provide known, multi-skilled personnel worldwide and are able to respond to both short turnaround and planned requirements, providing and mobilising labour from a single resource to entire crews, for short and long term projects.

The Eng-Cad Resource Department is available 24/7 to provide quality time served personnel, at all levels from Trade to Senior Management.

Eng-Cad operates transparent personnel resourcing procedures within a stringent ISO 9001 Quality Management System and Competency Assessment and Selection criteria.

Eng-Cad provides IRATA accredited multi-skilled industrial rope access technicians worldwide, offering working at height solutions such as inspections, repairs, modifications, installation and equipment removal.
ROLLS ROYCE - WASTE HEAT RECOVERY UNIT

Eng-Cad, together with AKD Engineering (Fabrication), were commissioned by Rolls Royce for a project based in Nigeria on the ‘Waste Heat Recovery Units‘ of the Gas Turbines that they had previously installed.

The WHRU’s, which are situated on an FPSO owned by Total, were found to have developed some defects with the exhaust internal lining plates.

Eng-Cad carried out surveys to establish the magnitude of the defects and to collate all the necessary dimensional and technical information in order to propose a solution. Once this design proposal had been agreed in principal, Eng-Cad then undertook a full structural design stress analysis using Ansys.

Upon completion of the analysis, all the relevant fabrication detail and assembly drawings were produced. Eng-Cad then worked in close liaison with AKD Engineering during the fabrication process. The linings were fitted on site in Nigeria, overseen by Eng-Cad supplied construction supervision.
ENGINEERING SERVICES

RESOURCES EXPERTISE

Eng-Cad’s Resource Department schedules and mobilises personnel as per project requirements on an international basis, allowing the appropriate personnel to be allocated and mobilised to satisfy client requirements in a quality and timely manner.

- Over 10,000 CVs held.
- 50% are known to Eng-Cad Staff.
- Proven track record for delivery of the required resources.
- Globally positioned local content, allowing for swift deployment.
- Client orientated and delivery focused.
SOURCE AND SUPPLY
The Resource Department are able to source and supply the following trades, internationally, both for Eng-Cad requirements but also for those of our clients:

- Barge Engineers
- Coxswain
- Construction Personnel
- Construction Supervision
- Crane Operators
- Deck Foreman
- Deckhand
- Discipline Engineers
- E & I Technicians
- E & I Supervisors
- Fabricators
- Floorhand
- HSEQ
- Hydraulic Technicians
- Helideck Competencies
- Mechanical / HVAC Technicians
- NDT Personnel
- OIMs
- Pipefitters
- Platers
- Riggers
- Rope Access Technicians
- Roustabouts
- Rig Builders
- Surveyors
- Welders
- Windfarm Personnel
Eng-Cad’s wealth of experience is no more apparent than within the Process and Piping design departments.

We can draw upon the talents of a dedicated team of high quality Engineers and Designers from a wide range of backgrounds including Oil & Gas, Petrochemical, Nuclear, Marine / Shipbuilding, Power Generation and Water Treatment facilities.

Our design facility is fully managed within both our ISO 9001 Quality Management System and that of our PED module H control process, ensuring full control of every safety and process engineering design activity, removing potential risk factors and ensuring full design optimisation in every aspect of our service offering.

Handling all aspects of the design cycle from initial survey and conceptual design, through full process analysis (utilising both the CAESAR pipe stress analysis package and CADWORX solid modelling techniques) and practical detail draughting, right up to as built survey and project sign off documentation. Our methodical approach minimises technical and commercial risks, ensuring our clients complete faith in both the quality of our work and the speed of our responses.

We have considerable experience in Piping Design of Floating Production Facilities; FPSO, FSU, FSO, FLNG, etc; including systems installed on all types of internal and external turrets. Our Pipe Stress Engineers are experienced with the complexities of pipe stress analysis on floating production units with respect to; vessel motions, hogging and sagging deflections, swivel deflections, etc.

Our Piping Engineers can fully develop piping specifications to client requirements and make specifications suitable for purchase of all piping equipment, valves and fittings.
Eng-Cad’s Structural Engineering department offers a broad experience base in analytical, stress resolution, detail design and a remarkable array of structurally related technical services to empower our clients to manage their design requirements within a transparent and risk free environment.

Utilising experience gained from an impressive range of backgrounds, including Oil & Gas, Naval Architecture, Nuclear Power Stations and Chemical Processing Plants, we are able to offer services ranging from simple design studies through to full conceptual design analysis and verified calculation stage, right up to production of fabrication drawings, on site dimensional control and full as-built survey facilities.

As with each of the other discipline departments within our company, the structural design works undertaken by Eng-Cad are fully controlled within the strict constraints of our ISO 9001 Quality Management System, thereby giving all our clients the confidence and security required to undertake their construction projects safely within the confines of our high quality design standards.

Utilising the latest technical advancements such as the AutoCAD, Intergraph, TEKLA 3D, STAAD, MASTERSERIES CADWORX and ANSYS finite element analysis programs, our mission of providing a service that is both cost and time efficient whilst minimising technical and commercial risks, is always met and our client’s expectations regularly exceeded.
Eng-Cad’s Electrical and Instrumentation team are an integral part of our multi-discipline design process, taking an active and often leading role in any process project or across discipline environment.

With substantial experience gained within the Marine Offshore, Petrochemical, Power Generation (Nuclear, Traditional and Renewable) and Water Treatment industries, we have built up an impressive reputation. Working closely with our Process / Piping colleagues we provide an innovative and cost efficient instrumentation and control solutions to ensure safe and measurable control management for any plant or equipment designed and analysed by our teams.

Tightly monitored within our ISO 9001 Quality Management System, we are confident that any design solutions proposed comply fully with all relevant standards and will satisfy (and generally exceed) any fit for purpose requirements imposed by current legislation and client specifications.
Eng-Cad’s Survey Department has been specifically formed to undertake accurate Laser Total Station Surveys known within the industry as DC Surveys or Dimensional Control Surveys, which does not just cover engineering. We also provide MBS surveys (Measured Building Surveys) Land surveys, and 3D scanning.

Using the right combination of equipment and proven methods, our trained surveyors are able to measure existing plant, equipment and assets to sub-millimetre accuracy throughout the fabrication and commissioning phase of any construction project, regardless of discipline.

Because of our extensive practical design and construction background, we are able to offer a comprehensive and flexible service removing the requirements for costly additional on site fabrication activities.

Our diverse portfolio already boasts a considerable variety of major clients within the Oil & Gas, Petrochemical, Nuclear, Public Utility and Renewable Energy fields and we are continuing to expand our horizons.

We are always happy to discuss and advise on any survey requirement you may have large or small.

All our survey activities are fully controlled within our ISO 9001 Quality Management System with regular quality audits and documented Leica equipment calibration to guarantee the quality of the final deliverable in every case.
Our 3D Scanning division focuses on using the right equipment for the right project and our in-house experienced team of surveyors can operate the latest hardware and software to ensure that the project is surveyed to suit your needs exactly.

Dimensional controlled results are combined together with the scanned data for improved accuracy. Total stations are still the preferred choice for flange angles and bolt hole rotation calculations, whilst the 3D scanners are used for clash detection and an overview of the entire area surveyed for added quality assurance.

FARO SCENE software is a comprehensive 3D point cloud processing and managing software tool for the professional user. It is specially designed to allow viewing, administration, and working with extensive 3D scan data obtained from high resolution 3D laser scanners like the FARO Laser Scanner Focus3D.

SCENE processes and manages scanned data easily and highly efficiently through a wide range of functions and tools, such as filtering, automatic object recognition, scan registration and positioning, as well as automatic scan colorization.

With SCENE WebShare, your scanned projects can be published on the Internet, and viewed with a standard Internet browser, uploaded to a specified drop box account or simply added to a USB stick, which ever is preferred.

**BENEFITS:**
- Reduce operation shut down time.
- Eliminate re-work & costly over-runs.
- Allows for Risk mitigation planning (the process of developing options and actions to enhance opportunities and reduce threats to project objectives).
- Help future maintenance & operations.
- Allows for last minute design changes from the comfort of your office “Desktop engineering”.
- Use point cloud clash detection & 3D conversion software such as “Kubit Point Sense Plant”.
- Added layer of quality control combining dimensional control with scanned data.
- No need for you, the customer, to purchase expensive software to view the survey results.
Eng-Cad’s impressive array of design disciplines described within this brochure are enhanced further by our full CAD draughting services to both compliment our design capability and to fulfil the CAD requirements of our clients as and when appropriate.

All of our CAD Technicians are highly competent users of both AutoCAD and Microstation industry standard CAD software applications. Furthermore, in line with the more sophisticated requirements of many ‘high-end clients’ we have substantial experience of 3D solid modelling, image rendering and animation generation software packages. We are also experienced in the use of discipline specific CAD packages such as TEKLA steelwork, Solid Edge and PDMS and are happy to supply deliverables in these higher level formats when required.

CAD draughting is generally serviced here within our Great Yarmouth Head Office; however, we are equally happy to supply CAD technicians to work within your offices if that is your preference. Furthermore, we have the facilities to supply CAD resource (including workstations, printers etc.) to establish a CAD ‘office’ at any on-site location to service the demands of any clients project requirements.

Our CAD technicians are skilled across the entire range of disciplines including Pipework, Structural Steelwork, Electrical, Mechanical, Architectural, Cartographic, animation and walkthrough technology, with all outputs strictly managed and controlled within our ISO 9001 Quality Management System, ensuring both the accuracy and integrity of all deliverable elements.
Eng-Cad Limited is pleased to offer a number of specialist training & educational courses to support your company’s needs. We strongly believe that “safety is no accident” and thrive to promote a safe working environment offshore & onshore.

S-cape and M.I.S.T. Courses are available with last minute bookings and an out of hours service to prevent your company “missing the boat”. We also run courses in the new International minimum safety training (I.M.I.S.T.) which is quickly becoming mandatory around the world as safety doesn’t stop at the North Sea.

Along with our safety training, Eng-Cad can offer tailor-made educational courses at our atlas E-learning approved centre. These courses cover a widespread genre from general Health & Safety to specific company needs within the oil and gas industry as well as other disciplines.

AutoCAD 2D/3D refresher & bespoke courses are also available at Eng-Cad. These courses are designed around the individual to work hand in hand to improve your AutoCAD skills or to learn new ones. The courses can be tailor-made to fit your discipline or simply refresh the skills you already have acquired.
The objective of the Quad 204 project is to provide a new build FPSO to replace an existing FPSO in the West of Shetland area that will enable the continued development and exploitation of the hydrocarbon reserves in and around the Quad 204 area.

Eng-Cad’s involvement in this project was with 5 separate Water Treatment Packages, the largest of which weighed in excess of 150 Tonnes.

Structural design and analysis was carried out on all of the packages, along with a full pipe stress analysis. Once this was completed, detailed fabrication drawings were produced of the structures, covering primary and secondary steelwork, hand railing, grating, ladders, access platforms and pipe supports etc.

In addition, once the pressure vessels had been delivered to the module fabrication facility, the dimensional control survey team carried out the necessary checks to ensure the vessels were fabricated within the correct tolerances and were suitable for installation in the packages.
On this particular project, working in close liaison with a major FPSO client, Eng-Cad were responsible for the conceptual and detailed design of all of the Process and Utility pipework, starting from the riser terminations on the geo-stationary side and terminating at the main pipe rack tie-ins situated on the vessel main deck (rotating side).

The work scope also included conceptual & detailed design of all firewater deluge protection along with all required pipe supports and additional ancillary steelwork.
The platform shown here is a compact facility that was designed to accommodate up to nine well slots, each featuring multiple string wells resulting in a total of 28 flow lines (oil production and water injection). Eng-Cad were given the responsibility of designing the gas lift facility for oil production wells, closed drain system with vessel and pump, PIG launcher and full firewater deluge and hydrant system.

The Eng-Cad design team’s responsibilities started with the preparation of all the required P & ID’s, right through to the conceptual and detailed design of all the associated pipework, including all pipe supports and ancillary steelwork.
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The WHRU’s, which are situated on an FPSO owned by Total, were found to have developed some defects with the exhaust internal lining plates.

Eng-Cad carried out surveys to establish the magnitude of the defects and to collate all the necessary dimensional and technical information in order to propose a solution. Once this design proposal had been agreed in principal, Eng-Cad then undertook a full structural design stress analysis using Ansys. Upon completion of the analysis, all the relevant fabrication detail and assembly drawings were produced. Eng-Cad then worked in close liaison with AKD Engineering during the fabrication process. The linings are currently being fitted on site in Nigeria, a process which has been on-going since 2011 and is being overseen by Construction Supervisors that are supplied by Eng-Cad.
INDE FIELD DECOMMISSIONING

The Inde Field Decommissioning project was initiated by Shell UK once it had been decided that the asset was no longer a viable concern. The overall contract was awarded to the Norwegian company A.F.Decom who then actively sought partners who would be able to assist in this major project.

Eng-Cad’s role in the project included a team of engineers, designers and surveyors, who worked closely with Shell UK and A.F.Decom, to provide a service that would enable the successful and safe decommissioning and removal of the topside facilities of Inde Juliet, Lima, Kilo, Mike and November platforms, in preparation for the removal of the jacket structures.

The team were directly involved in the offshore site surveys, production of destruct drawings and calculations, risk assessments, lifting plans, job cards incorporating full man-hour estimating and also actively participated in progress, planning and safety review meetings with all of the parties concerned.
The project requirement was to design a steel grillage to support the Ampelmann A-04 offshore access system on board a specially modified vessel.

The Ampelmann A-04 system was designed to enable personnel to be safely transferred from a vessel or barge to a fixed or floating structure and does so by the use of 6 hydraulic cylinders which makes the system self-stabilizing and capable of compensating actual heave motions of up to 2.5 metres.

Eng-Cad have been involved in offshore access bridges in many different capacities, whether it be modifying an existing bridge, providing structural analysis for re-certification of an existing bridge or to design, detail and fabricate a completely new bridge.

The one shown here is a 20 metre access bridge that was designed and detailed on behalf of AJS Great Yarmouth. The bridge was manufactured for use in the North Sea Southern Sector for Shell UK, initially for use during shutdown & maintenance campaigns on the ‘Upgrade Project’ in conjunction with a jack-up barge such as Seafox 4.
Eng-Cad were awarded the task of providing a feasibility study of providing high-level adjoining access walkways for 3 scrubber platforms that sit alongside a compressor building at a Bacton Gas Terminal. The study had to take into account the handling and installation of the steel work over a complex arrangement of pipework & equipment.

Following the successful completion of the study, Eng-Cad was given the contract to undertake a full design of the walkways & stair tower, providing structural calculations & fabrication/assembly drawings, as well as liaising and assisting the approved fabrication contractor during both fabrication and installation phases.
CPT FRAMES

Eng-Cad have designed & detailed a range of CPT seabed frames/units for a sub-sea surveying company.

The scope of work that is usually provided by our client included details of all the equipment inside the unit & the maximum size allowance for the surrounding frame. From this our engineering team provided fabrication drawings / assembly details and any design calculations required for approval by the appropriate authorities.

RACKING BOARD

An additional intermediate racking board was required for a drilling derrick in Columbia.

Eng-Cad’s scope of work was to provide a dimensional survey of the existing mast & racking board, followed by structural design calculations & fabrication drawings for the new racking board, which was successfully installed on site in Columbia.
PIECE SPOOL REPLACEMENT

As a result of close working relationships with many fabricators within our region, quite a large aspect of the dimensional control survey team’s workload involves new or replacement pipe spools. This could be just to simply provide a dimensional control report of pre and post-weld dimensions for the client.

More often than not though, a much larger responsibility is placed upon us where the engineering team would take care of the design, fabrication, dimensional control and installation of the pipe spools. Typically an offshore survey of existing pipe work would be carried out, fabrication isometrics produced and an appropriate fabrication insulation contractor appointed. Full dimensional control would be applied during and on completion of this fabrication work.

Eng-Cad would also carry out any additional design criteria such as piping calculations and PED approval, making this type of project a ‘Turn-Key Solution’.
Eng-Cad were supplied with a Marine Architect’s 3D model of a proposed rudder and were asked to design a fabrication ‘JIG’ to be used as an aid for assembly and construction of a multiple number of rudder blades within tight tolerances.

Structural calculations and detailed fabrication drawings of the ‘JIG’ were then produced for the fabrication contractor, and to ensure that the final product was fit-for-purpose, Eng-Cad provided a full dimensional control service to give assurance both during and after fabrication.

**JIG DESIGN, FABRICATION & ASSEMBLY**

After completion of the ‘JIG’ for the above project, Eng-Cad were given the opportunity to participate in the contract one stage further by being asked to oversee the dimensional control aspect of the rudder component fabrication.

This scope of work took place over a 3 month period and involved the rudder stock alignment through to final assembly, with results being given to sub-millimetre accuracy at all times.

**RUDDER DIMENSIONAL CONTROL**
Due to the age of some of the existing plant at the Bacton Gas Terminal, Eng-Cad has regularly been presented with the task of providing the necessary information required to replace these items.

For example, on one of the sites the survey team have carried out on-site dimensional control surveys on the existing accumulator and re-boiler assemblies. Reports were then produced which were followed by fabrication detail and assembly drawings for the plant replacement, including associated pipework that had been affected by the change.

A dimensional control survey was carried out at another of the Bacton Gas Terminal sites of an existing scrubber vessel.

A report was produced for the client, followed by a full detailed fabrication drawing of the vessel, which was sent out for tender & ultimately fabricated & installed at Bacton.
When an offshore service provider had a number of failed attempts to unblock a high pressure cement line, Eng-Cad were asked to investigate an engineering solution to remove and re-install the pipework.

Once the existing line was surveyed, it became very obvious that replacing ‘like for like’ in this case was not practical for removal, replacement or future maintenance activities. Taking that into account, it was decided that a 3D laser scan survey should also be undertaken during the dimensional control survey of the existing line. The laser scan survey provided 3D data accurate to within +/- 5mm of the entire area concerned.

This data allowed our engineers and designers to provide a number of engineering solutions/proposals from the office without the need to return to the offshore facility. An AutoCAD 3D model was then created and we were able to produce construction isometric drawings of the new pipeline with the added assurance of no on-site clashes.