



trident
engineering consultants

**Specialists in fuel storage and distribution
design**

Company Presentation

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Trident Engineering Consultants



Specialists in fuel storage and distribution design.

Trident Engineering Consultants

Trident Engineering Consultants (TEC) is a multi-disciplinary engineering consultancy, which has over 25 years experience in providing engineering services to the downstream Oil & Gas industry.

During this time, we have enjoyed repeat business from major oil companies within the U.K. and overseas. The company has a core of professional staff, comprising of 30 engineers & designers and administrative support staff.

We have a backbone of senior staff, with between 10-25 years service with TEC, who have conducted design and engineering projects which have met with all our previous client's requirements.

Our key areas of expertise are:

- Project Management and Planning
- Marine Off-loading & Product Receipt into Storage
- Marine Off-loading pipeline stripping
- Storage Tank Design
- Road Tanker Bottom Loading Facilities
- Road Tanker Loading Gantries - Additive Injection Systems
- Ethanol Receipt, Storage and Blending Systems
- Aviation Fuel Receipt, Storage, Distribution & Quality Control
- Vapour Recovery Systems
- Terminal Automation, Control and Instrumentation Systems
- Fire Protection Systems
- HAZOP / HAZID processes
- SIS / SIL / LOPA – analysis, specification & verification
- Process Calculations & Analysis
- Equipment & Material Specification
- Long Lead Equipment Procurement

Trident Engineering Consultants

The Company maintains a high level of corporate identity in the marketplace and undertakes the following;

- ▣ Preliminary Technical and Economic Feasibility Studies.
- ▣ Front End Engineering Design (FEED) Studies.
- ▣ Project Specification and Conceptual Design.
- ▣ Detailed Cost Estimating.
- ▣ Programme Planning.
- ▣ Complete Technical Design Engineering and Detailed Specifications.
- ▣ Procurement Services.
- ▣ Project Management and Commissioning Service.
- ▣ Maintenance Manuals.
- ▣ Planned Preventative Maintenance Management Systems.

Trident Engineering Consultants – Projects



Import / Export and Bulk Fuel Storage Facilities - Redevelopment

Inverness Terminal, U.K.

Our client made a major investment in their Inverness Terminal. Trident Engineering Consultants - successfully designed and project managed the Terminal Redevelopment, Offloading / Loading Facilities, Bottom Loading Gantries, Vapour Recovery System, New Pump Units, Product Transfer Pipe work and the Installation of Electrical Metering Systems, with a combined project value of £2.5 million.



Trident Engineering Consultants – Projects



Import / Export and Bulk Fuel Storage Facilities - Redevelopment

Aberdeen Terminal, U.K.

Joint venture terminal redevelopment between two major international clients. New storage tanks, road loading facilities, multi-user additive system, new water/foam fire hydrant, sprinkler and drencher systems, reposition of marine – offloading jetty for larger vessels and install new bunkering facilities. Ships off loading facilities were upgraded to accommodate 6000 tonne vessels (from 3000 tonne). Trident redeveloped this Terminal installing 4 new storage tanks, truck loading facilities and fire protection.

As part of a further re-development phase, Trident completed the design, supervision and commissioning of 2 Double Walled 4500 tonne vertical tanks. The Project Design, Project Management, site supervision and commissioning was conducted by Trident Engineering Consultants.



Trident Engineering Consultants – Projects



Import / Export & Bulk Fuel Storage Facilities

Nustar / Ross Chemicals / BP Oil UK - Grangemouth, U.K.

Trident successfully completed the Design and Project Management of the Plant upgrade pictured here in the foreground in 1995.

Further projects completed at this plant to date include truck bottom loading, water foam fire protection, terminal automation, additional 3 x 5000 tonne vertical tankage (1998), new ship receipt storage, truck loading and vapour balancing and Butyl Acrylate (1999).

Trident has also carried out projects for Rohm & Haas in their Chemical Storage Plant in Grangemouth. In the background is BP's Grangemouth Refinery where Trident is pleased to have been associated with projects dating back to 1987, when the company was founded.

Trident has recently carried out a Hazardous Area Classification review for Forth Port Authority, owners of The Port of Grangemouth.



Trident Engineering Consultants – Projects



Import / Export and Bulk Fuel Storage Facilities – New Build

Mombasa, Kenya

This project was a new Terminal Build, where Trident conducted the Mechanical & Electrical Design for this Oil Storage Terminal. Involved at all stages of the project from initial planning, design and project management. The site has tankage with a capacity of 110 million litres, at a cost of 60,000,000 USD. The project scope included all product pipework and associated equipment, Road Tanker Loading, Tank Gauging, Tank Overfill Protection System, Terminal Automation (including tie-in to an existing Terminal for data exchange), Terminal Lighting and a Fire/Foam Protection System (pump house & firewater system designed to NFPA standards).



Trident Engineering Consultants – Projects



Import / Export and Bulk Fuel Storage Facilities – New Build

Mombasa, Kenya

Trident Engineering were the Lead Engineers, responsible for the project management, engineering design & procurement of this New LPG storage Terminal. This new storage terminal comprising of a conventional buoy mooring (CBM), 5km x 12" cross-country pipeline, LPG bullet storage, road truck loading facilities and site fire-fighting ring main & drencher system.



Trident Engineering Consultants – Projects



LPG Plant Design and Construction

U.K. Wide

Trident is responsible for installation of LPG facilities for BP Oil's UK petrol stations. Trident carries out installation and commissioning of LPG facilities in accordance with BP specifications. It provides design and development of fully buried and aboveground systems for storage of LPG at the retail forecourts. Trident also provides on site supervision and commissioning of LPG installations throughout the UK via its team of highly qualified and experienced engineers.



Trident has successfully completed the Design and Build of LPG Installations for major supermarket retail sites.

Trident Engineering Consultants – Projects



Import / Export and Bulk Fuel Storage Facilities – Refinery Conversion

Mersin, Turkey

Trident Engineering were tasked by the client to conduct various projects, including detailed design, peer design reviews, analysis and studies of this refinery location for conversion to bulk fuel storage.

Detailed design projects included DERV Rail Loading, Jetty Pipework Replacement and Crude Tanks – Product Interchange.

FEED and feasibility studies of Aviation Fuel storage (Jet A-1), Bulk Gas Oil Additive systems and introduction of 92 RON.

Gap Analysis studies of site-wide earthing and Hazardous Area inspection.

Peer design review of Single Line Diagrams (SLDs) and pipework upgrades.



Trident Engineering Consultants – Projects



Aviation Fuel Storage Terminal

Bristol, U.K.

Detailed design, Engineering and project management for the redevelopment of an existing underground bulk fuel storage depot for dedicated aviation products, comprising 8 No. storage tanks of total capacity 62,000m³.

TEC appointed as EPC contractor responsible for engineering, design, procurement and preparation of tender documents for construction sub-contractors, site supervision and commissioning of the works.



Trident Engineering Consultants – Projects



Aviation Fuel Tanker Facility

Bristol, U.K.

Design & Engineering for a new deep water berth for maximum 80,000 dwt vessels, 2 x 12" unloading arms and 2 x 16" import pipelines (piggable) x 13km via booster pump(s) station to tie-in cross country pipeline system including hydraulic and flexibility analysis studies.

TEC appointed as EPC contractor responsible for engineering, design, procurement and preparation of tender documents for construction sub-contractors, site supervision and commissioning of the works.



Trident Engineering Consultants – Projects



Airport Fuel Farm

Mattala Rajapaksa International Airport, Hambantota, Sri Lanka

Trident was requested by the client to design a greenfield airport fuel farm. Our project involvement included;

- Proposing layouts of fuel storage, receipt and loading gantries
- Detailed design - Including: API 650 Tank Design, Fuel Receipt Gantries, Fuel Loading Gantries, Fuel Quality Control, Fuel Storage
- Civil Calculations - Including: Gantry Calculations, Pipe Bridges, Bund Calculations, Foundation details.
- Process Calculations - Including: Hydraulic Analysis of fuel and fire fighting systems, Surge Analysis of fuel system, Stress Analysis of pipe arrangements
- Fire Fighting - Including: Fire Water Assessment, Design & Specify Fixed Fire Equipment.



Trident Engineering Consultants – Projects



Airport Fuel Farm

Caticlan Airport, Philippines

Trident was requested by the client to design an airport fuel farm. Our project involvement included;

- Detailed design - Including: Fuel Receipt Gantries, Fuel Loading Gantries, Fuel Quality Control, Fuel Storage
- Civil Calculations - Primary and Tertiary Containment Calculations
- Process Calculations - Hydraulic Analysis of Fuel Farm and Airport Fuel Hydrant
- Fire Fighting - Including: Fire Water Assessment, Hydraulic Analysis of Fire Fighting System, Design & Specify Fixed Fire Equipment.



Trident Engineering Consultants – Projects



Fire Water Cooling Systems

Shell Kampala, Uganda - BP Buncefield, U.K. - Shell Jarrow & Stanlow, U.K.

- Trident carried out the design for upgrading the existing LPG Storage & Bottling Plant, fixed Fire Water Cooling System to NFPA 15 and installed a new 60 tonne LPG Storage Vessel at Kampala Terminal.
- Trident have also upgraded the fire water cooling & foam deluge system at the BP Oil Terminal at Buncefield (Hemel Hempstead).
- Water/foam deluge system at the road & rail loading gantries at the Shell Jarrow and Stanlow Terminals.



Trident Engineering Consultants – Projects



African Downstream Projects

BP Tanzania – Dar es Salaam, Moshi & Mwanza

Following approval from the World Bank, Trident designed and commissioned the replacement pipelines and leak detection system for BP Tanzania Limited to replace the 2.5km long oil and gas pipelines between the Kurasini Oil Jetty and BP / Gapco / Caltex storage terminals. Trident also carried out the redevelopment of various BP rail siding accommodating two different railway gauges with an impervious surface and drainage systems.

Trident were then commissioned to design the redevelopment of BP's Moshi and Mwanza depots comprising new storage tanks, rail receipt, truck loading, offices, parking and drainage systems.



Trident Engineering Consultants – Projects



Import / Export & Bulk Fuel Storage Facilities - Modernisation

Nustar / Ross Chemicals - Grangemouth, U.K.

Trident conducted the design to facilitate the modernisation and extension of the terminal comprising;

- Truck Loading
- Vapour Collection System
- Meter Proving Return System
- Additive Injection System
- Environmental upgrading
and
- Terminal Automation System.



Trident Engineering Consultants – Projects



Storage Tank Projects

U.K. wide

From 2012-2015 TEC have been contracted to design and manage a major tank farm refurbishment project within the UK. Scope includes replacing tank floors (jacking 5000m³ tanks), construction of a new tank bases/bunds as well as a full M&E scope (value £5 million GBP).

During the same period Trident have also designed and project managed large vertical tank construction projects in the Shetlands and Channel Islands

Tank Related Services:

- **EEMUA tank assessments** (Calculating Tank Risk Based Inspection frequencies and Remaining life).
- **Detailed Repair Plans** developed from NDT inspection reports.
- **Management** of tank of cleaning & Inspection programmes inc. tendering of all aspects of the work (TEC currently manage over 700 tanks throughout the UK).
- **Site supervision** of tank entry/confined space working.
- Complete **Design and Build** service.



Trident Engineering Consultants – Projects



Greenfield Development Projects

U.K. wide

Since 2012 Trident have successfully completed several greenfield developments throughout the UK, average development cost £1.3 million.

Trident's role on the these projects;

- Prepare outline estimates
- Feasibility Studies
- Detailed Design
- Tendering and Analysis
- Budget Control
- Project Management
- Onsite supervision



Trident Engineering Consultants – Projects



Brownfield Development Projects

U.K. wide

Trident have designed and project managed the redevelopment of over 20 brownfield sites in the UK over the last three years, total cost £9 million.

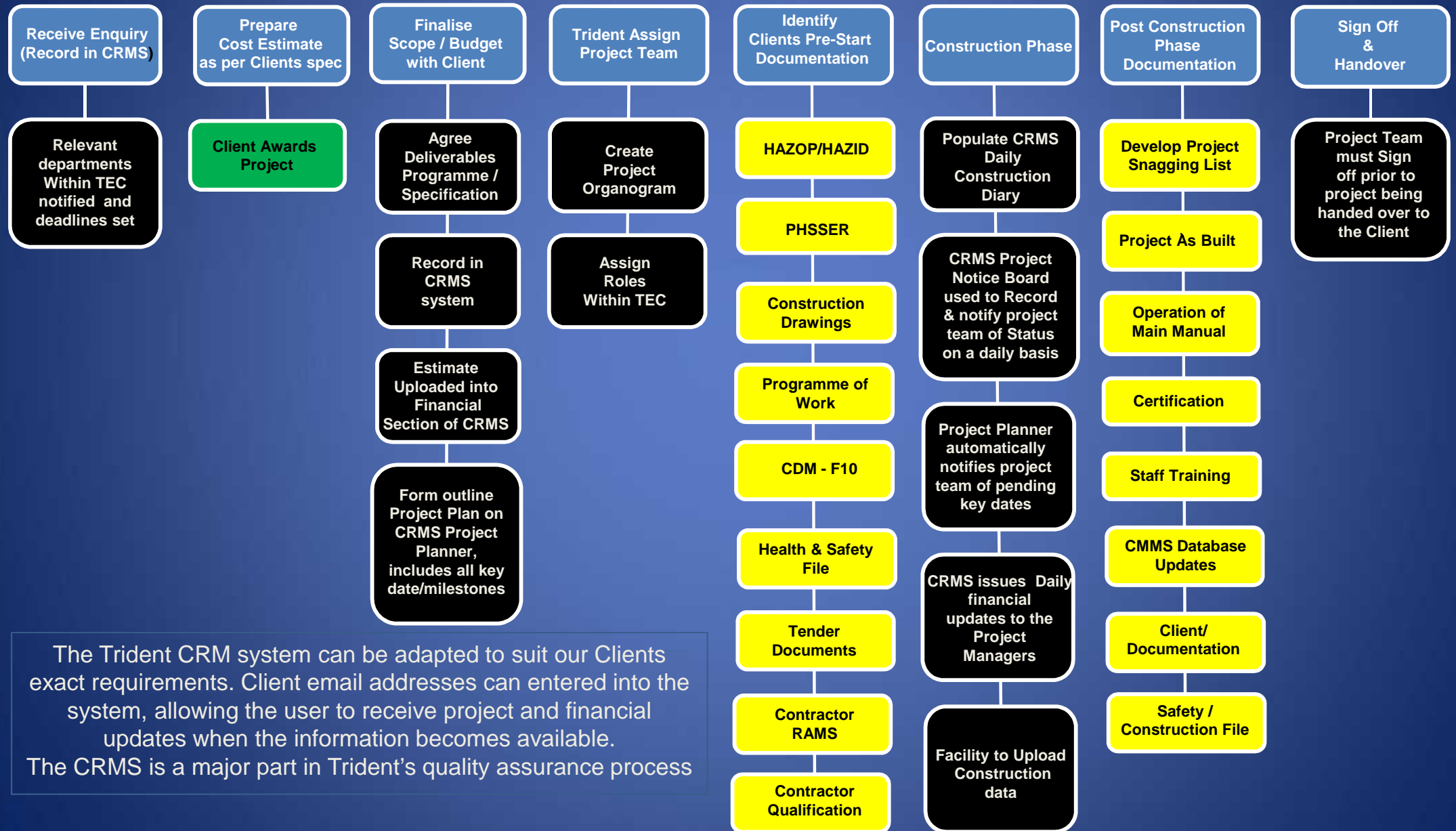
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Trident Engineering Consultants

Client Relationship Management System (CRMS) - Typical Work Flow



The Trident CRM system can be adapted to suit our Clients exact requirements. Client email addresses can entered into the system, allowing the user to receive project and financial updates when the information becomes available. The CRMS is a major part in Trident's quality assurance process

Trident Engineering Consultants

Trident Core Values

Safety

Safety is Trident Engineering's priority and we ensure that in all our work, it is paramount.

Relationships & Teamwork

Collaboration and development of relationships on a mutual dependency and trust basis, Trident and approved contractors operate as a team (your performance is our performance).

"A good job reflects on us all, similarly a bad job"

Professionalism

At all times represent Trident Engineering in a courteous, professional and co-operative manner.

Communication

Keep open channels with our Clients, Contractors & Suppliers at all levels.

Respect

Value the position of others.

Enjoyment

Enjoy our work and take pride in all that we do.