MTE | Design Consultancy

Case Study | White Rose Extension Project, Newfoundland

Blast and Fire Rated Integrated Buildings, Blast Walls and Heatshields

Scope of Work

Design and engineering study of the structure, electrical and HVAC elements for a number of different blast and fire rated integrated buildings, of various use, and dedicated blast walls and heat shields for the Well-head platform. The scope also included for the compilation of the overriding Functional Specification.

Client Requirements

In 2014 Mech-Tool Engineering Ltd (MTE) was awarded a design contract to design and develop several blast and fire rated integrated buildings to house office space, tools stores, switchgear and electrical equipment on the Well-head platform as part of the White Rose Extension Project.

The Client required MTE to review the existing specifications and develop/compile the overriding Functional Specification detailing the structural, electrical, architectural and HVAC requirements of the buildings.

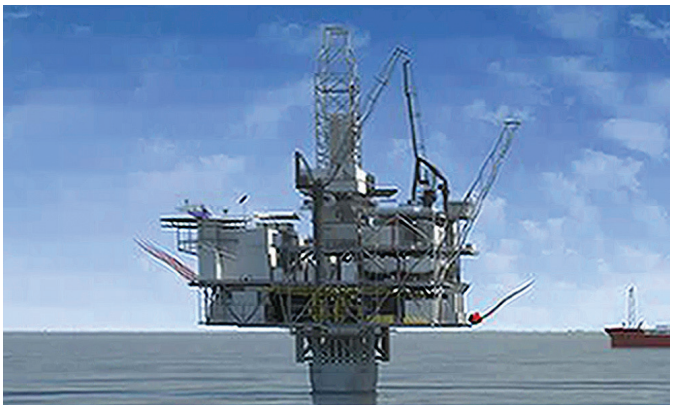
The designs needed to account for material selection and preservation, significant blast and fire loads, exacting company and international specifications and a minimum design life of 25 years.

In addition to the Functional Specification the client requested detailed Design Report & General Arrangement drawings for the increasing integrated building scope, the stand alone blast walls and heat shields. The information provided needed to include minimum weights and reactions back into the primary steel, expected wall zones and deflections.

MTE Solution

Based upon the outline specification available upon contract award, the Functional Specification was developed and enhanced as the contract continued. Many modifications to the integrated buildings, including the repeated addition of new buildings to the scope were reviewed and assessed on a case by case basis to meet the blast, fire and performance (Electrical/HVAC) criteria set. The result was a highly defined and optimised design as presented in the detailed Design Report and backed up by General Arrangement drawings. In combination these deliverables highlighted the structural design concept, provided accurate weights, deflections, wall zones and reactions back into primary steel, whilst offering the fire resistance required.

As standalone items, the blast and fire loads applied to the blast walls were reviewed using a fully dynamic approach, which allows for the accurate calculation of Dynamic Amplification Factors, Strain Rate Enhancement Factors and an optimised design in terms of space, weight and reactions.



The heat shielding requirements were reviewed and assessed against a highlight tested and verified system capable of meeting the heat flux reduction targets, whilst also being able to provide accurate structural performance data and once again space, weight and reactions.

The Functional Specification not only captured the above in summary but also highlighted the requirements and standards to be adopted and followed when designing all the associated systems within the integrated buildings. This included areas such as, material selection and protection, lifting, welding, tolerances and allowable deflections. Health, Safety & Environmental regulations linked into requirements for escape routes, Fire & Gas detection systems, acoustic and thermal performance requirements.

The detailed Electrical and HVAC information including heat loads and flow rates allowed the design of the lighting and HVAC systems to be well defined. The specification also identified the requirements associated with testing and inspection, windows, doors and areas where PFP would be required.

The optimised final design solutions consisted of fully welded profiled stressed skin wall panels and flat plate stiffened floor and roof sections. The necessary steel grade was required to be impact tested at -20°C to ensure suitability within the specified environmental location together with the necessary internal insulation to provide for the extreme temperatures experienced.

MTE Ltd

MTE Design Consultancy are a team of experienced design engineers, project leaders and draughtspersons with skills in all areas of engineering consultancy, conceptual design, layout and detail engineering.

MTE Design Consultancy has developed its own unique programmes and systems to offer a wide range of highly accurate design and cost projection services. These elite tools are the culmination of in-depth experience and knowledge built up over 50 years. They have been independently validated and tested for their reliability in solving thermal, mechanical and structural problems.

Because of our extensive expertise in blast and fire technology we believe our involvement at the design evaluation stage of a project such as Feasibility Studies, FEED and Design for Manufacture including certification will lead to greater optimisation of the engineering alternatives with subsequent weight and cost saving benefits.

MTE Design Consultancy services include:

- Blast report reviews and interpretations
- Stressed skin blast and fire design
- Blast relief studies
- Basis of design and functional specification compilation
- Blast and fire wall design optimisation
  - weight / space reductions
- HVAC / electrical / modularisation optimisation studies
- Thermal / fire / PFP design optimisation

To enquire about MTE Design Consultancy services or to discuss your specific requirements, please contact the sales department:

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