

OUR TECHNICAL CAPABILITIES



INVESTIGATE • INNOVATE • DESIGN • CREATE • SOLVE

Windsor Energy's Technical Group is the cornerstone of our business

BACKGROUND

The Windsor Energy Technical Group engineering teams have over 30 years' experience in the design of Energy Plants across Australasia and the world. In addition to designing new plants and upgrading existing plants, we support clients around New Zealand and Australia addressing their design challenges by providing practical engineering solutions. We can offer support for all your design needs in the following areas.

MECHANICAL DESIGN CAPABILITIES

- Boilers designed to AS 1228, ASME Section 1, EN 12952, EN 12953, BS 2790, BS 1113
- Pressure Vessels and Heat Exchangers designed to AS 1210, PD 5500, ASME VIII and TEMA
- Tanks designed to AS 1692, API 650
- Stacks designed to CICIND, BS 4076, ASME STS
- Seismic design to NZS 1170.5, incorporating ENZ Practice Note 19.
- Design of small structures, access platforms, ladders and stairways to NZS 3404, AS 4100, AS 3990 and AS 1657.
- Plant piping design including :
 - Specifications and line sizing
 - Piping layouts
 - Pipe Stressing to ASME B31 codes using AutoPIPE™, including the management of 3rd party design verification where necessary
 - Gas piping design to ASME B31.3 and in accordance with NZS/AS3814. Certified in-house by WorkSafe Approved Practitioners
 - Piping isometrics for fabrication using Autodesk Plant 3D
 - Pipe supports

- Plant design utilising Autodesk Navisworks
- Equipment design using Autodesk Inventor
- FEA Analysis using ANSYS
- Risk Assessment and Hazard Controls
- PECPR compliance through to design verifications and support for discussions with site inspectors.

PROCESS DESIGN CAPABILITIES

- Front End Engineering Design (FEED) studies
- Biomass Conversion Desktop Assessments
- Heat & Mass Balances
- Process Flow Diagrams
- Plant Efficiency Evaluations
- Process & Instrumentation Drawings (P&IDs)

OPERATIONS CAPABILITIES

- Commissioning
- Boiler Tuning
- Performance trials
- Operational support
- Operator Training
- Technical product evaluation and selection

ENGINEERING SOLUTIONS TO MEET YOUR NEEDS

**Engineering is a systematic approach
to addressing a technical opportunity**

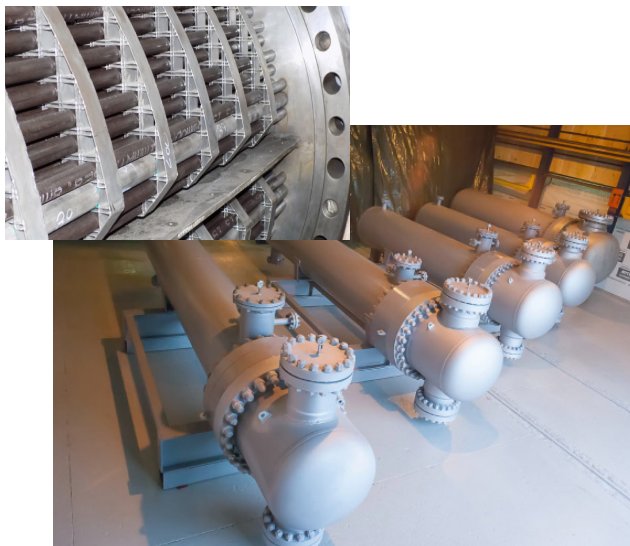
PROFESSIONAL BODIES

Windsor maintains an active membership of ENZ (Engineering New Zealand) and a number of our team are Chartered Members (CMEngNZ) including IntPE(NZ) and RPEQ and Worksafe Approved Gas Practitioners.

RECENT PROJECTS

HEAT EXCHANGER REVIEW

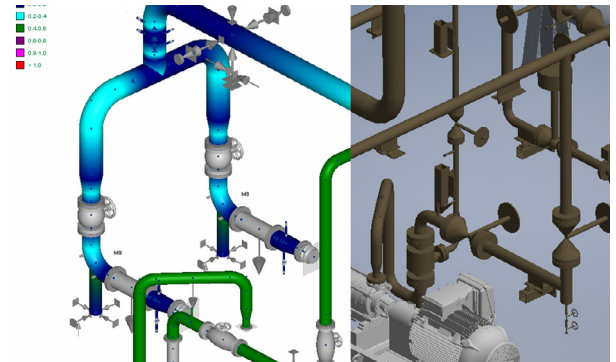
Windsor Energy can undertake the mechanical design of shell & tube heat exchangers using the latest COMPRESS™ software in accordance with TEMA and ASME VIII Div. 1 code requirements. Our team has been involved in special requests such as metallurgical improvements of heat exchanger plates and forgings affected by corrosion problems. We have designed and replaced some of the existing SS clad carbon steel heat exchanger components with stainless forgings and plates to mitigate corrosion issues. The changed metallurgy often dictates changed design thicknesses and our design has ensured that the correct existing nozzle interfaces and the existing equipment footprint is always maintained.



RE-DESIGN OF BLOWDOWN SYSTEM

The intermittent operation of an installed blowdown piping system was causing excessive water hammer, resulting in loud noise and significant pipe movement. We undertook a blowdown system review to address the issues. The solution included the use of a steel tank sump underneath an elevated blowdown tank which removed the need to carry out expensive foundation works. The existing blowdown tank was modified to accommodate the intermittent inflow it was experiencing. We designed an intuitive wastewater pump system

incorporating the existing pipework reducing the amount of additional pipework needed.

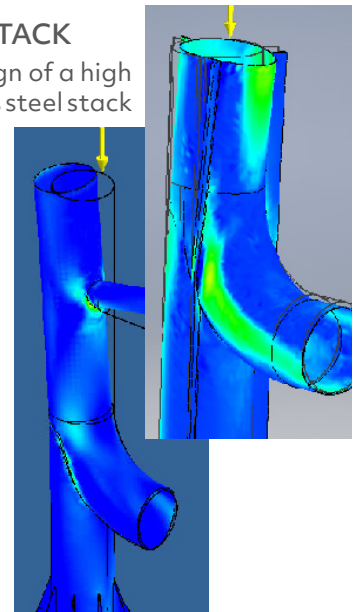


VIBRATING GRATE THICKNESS REVIEW

Our client was experiencing high localised corrosion that exceeded the Design Verification Certificate allowance. We were able to review the design and calculate the minimum thickness required to withstand the internal pressure and grate shaking induced stresses. Our review will allow our client to extend the lifetime of the grate, with the least disruption to their plant operation. This will save operating costs and delay a full replacement of their asset.

DESIGN OF KILN STACK

We reviewed the design of a high temperature stainless steel stack that had the support skirt welded to a 900 elbow. This joint could not be analysed using conventional design procedures and stack codes without a significant increase in material. Our approach was to undertake a detailed FEA analysis of the junction and with minor additional stiffening we were able to improve the design.



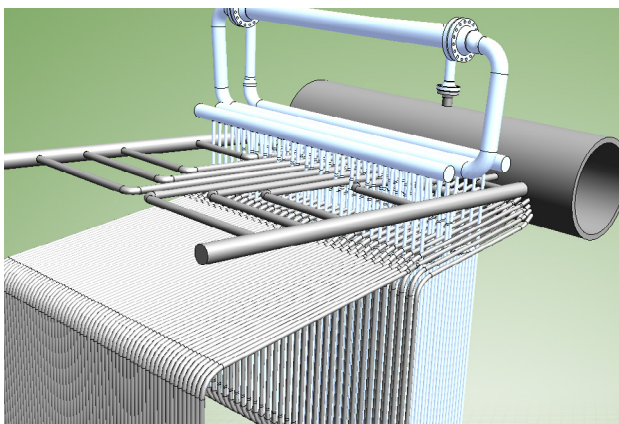
FUEL DRYING EVALUATION

Windsor advised on the selection and integration of wood chip drying equipment into an existing timber mill plant. The drying equipment was to utilise low-grade heat direct drying from the flue gas exhaust of the existing wood-fired boiler. The customer was presented with evaluation of seven separate dryer solutions ranging in technology from belt-dryers to rotary drum dryers. The study was a complete desktop analysis and concluded with a report outlining the comparison between technologies and indication of pricing for the purchase and integration of each.

ENGINEERING SOLUTIONS TO MEET YOUR NEEDS

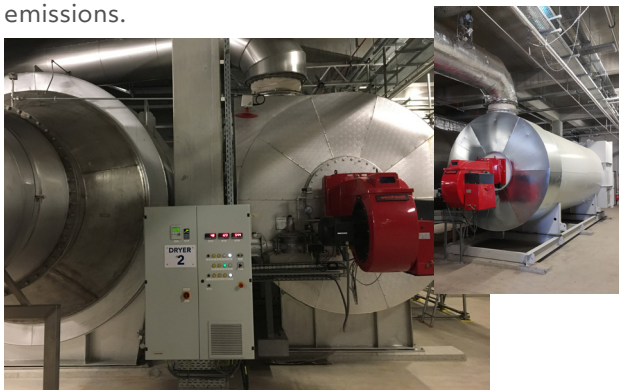
EVALUATION OF IN-SERVICE Cr-MO SUPERHEATER PIPING TO B31 CODE

The superheater to steam turbine pipe had been modified over the years to meet the changing plant requirements and corrosion issues. To satisfy the PECPR requirements the statutory inspector requested a design verification of the line in its current form. We did the complete stress analysis including the seismic evaluation to current seismic code and loads imposed on boiler and turbine. When found to be non-compliant with the current seismic code, we redesigned the spring supports and added two hydraulic snubbers to bring the loads on the turbine nozzle back within allowable limits.



AIR HEATER COMBUSTION CHAMBER REPLACEMENT

Windsor have replaced a series of combustion chambers for industrial air heating equipment across Europe. Windsor was not OEM for the pre-existing air heaters but solved a recurring issue of failing combustion chambers across all the appliances. Windsor have a proprietary in-house design of air heater appliances. We were able to analyse the performance of the existing appliance to reach a safe robust solution and remove and replace the failed combustion chambers. The replacements consisted of Windsor's proven inhouse design retrofitted to the existing heat exchanger and utilising as much existing componentry as practical. The final design was CE complaint and met the stringent European standards for air emissions.



BIOMASS CONVERSIONS

Our team is experienced in the frontend engineering and design requirement associated with converting existing solid fuel boilers to biomass. Upon validating the suitability for conversion, Windsor are then able to offer the full suite of engineering disciplines required to execute the work.

A recent success story has been the conversion of a 43MW coal fired superheated steam boiler to run entirely on wood pellets without losing any capacity.



ENERGY PLANT OPERATION SUPPORT

Our team is experienced in helping clients operate their boiler plants in the most efficient way. This includes boiler tuning, operational troubleshooting and plant improvements.

This support can range from troubleshooting a complex gas burner management issue, supporting a client with extremely low boiler turndown operation, or integrating gas fired load burners into a solid fuel furnace.

Why Windsor Energy?

- A trusted provider of energy plant and services in New Zealand and Australia.
- Extensive installed base of heat plants for a number of large industrial clients
- Modular plant package, optimised for long-distance transport of components, and efficient, safe assembly at destination.
- Innovative designs for high efficiency, simple operation, high availability and low overall cost of ownership

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