

Case Study No.2 – Radford Yarn Technologies

Installation of a 150 Kilowatt (kW) specialist biomass boiler to be run on wood pellets, converting from electricity



Radford Yarn Technologies process natural New Zealand wool into a range of high-end felted yarns for carpet and rug manufacture. Heat is required for their felting plant, and their yarn drier.

Project Background

Radford Yarns has won international and national awards for its technology and innovation. The company's aim is to deliver "innovation on a world stage", and in 2006 it acknowledged the importance to its customers of environmental responsibility by initiating a project to lower the operation's environmental footprint. Deriving a significant part of the plant's energy needs from renewable sources would contribute to this.

Until this point Radford Yarns had obtained this heat from electricity as its primary source of energy, they were worried about rising prices and the inability of the system to provide the required heat in a timely fashion. A comprehensive study was completed to assess different energy options as any alternate energy source had to also be commercially viable.

Critical aspects of their assessment of the options were the overall environmental foot print, the capital cost of the equipment, the current and future cost of the fuel, the reliability of supply of the fuel, and the ability of the fuel to provide the quality and capacity of the heat that they required.

Background stats

150 kW HDG Compact biomass boiler

Prior to installation:

- Total electricity consumption: 1,000,000 kWh per annum.

Following installation of wood pellet boiler:

- Production run time 33% more efficient
- Electricity consumption: 450,000 kWh per annum
- Wood pellet consumption: 500,000 kWh per annum
- Direct energy savings: \$72,500 per annum (based on electricity and pellet prices at time of going to print)

Project detail

The system was designed incorporating a 3,000 litre buffer tank between the heat loads and the boiler. This enables a ready storage of heat to be used instantaneously, an important component in their production process. The boiler is governed by the heat demand from the buffer tank, and will automatically maintain the buffer tank at 90°C. This also has the advantage that when the boiler runs, it will run most efficiently at its full capacity, rather than on a part load when there is a low demand for heat.

Radford Yarn's drier constitutes the major heat demand. The nature of this demand is that large volumes of heat are required quickly for relatively short periods of time. The challenge for the design was to meet this heat demand using a biomass boiler, which are traditionally slower to obtain maximum heat output from a cold start.

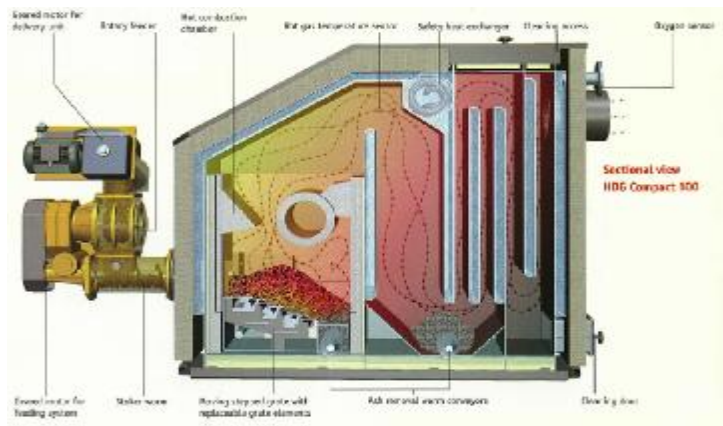
This was achieved by:

- The use of the 3,000 buffer tank as a heat store,
- The installation of a relay directly from the drier to the boiler with instructions to start with the drier irrespective of buffer tank demand,
- The use of wood pellet fuel, which will react quicker and reach temperature faster than other biomass fuel options such as wood chip.

These three aspects of the design have allowed optimisation of boiler size. The improvement of the drier's heat output using wood pellets has improved the company's production run time by 33%.

A second challenge for this installation was the design of the fuel storage and handling system. Adaptation of standard grain and stockfeed handling equipment, such as silos and augers was successful, although some experimentation with different flights within the auger was necessary.

HDG Boiler schematic



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Radford Yarns wood pellet boiler house, fuel storage delivery system.



Wood pellets are made entirely from timber processing waste. It is recognised as being carbon neutral.

HDG Compact Boiler:

- Can burn wood pellets, wood chip and wood shavings
- Automatic ignition, ash removal, and heat exchanger cleaning
- Air cooled moving stepped grate
- Rotary feed for burn back protection
- Low emissions
- Low maintenance
- High efficiency

Further information is also available on our website:

www.switchenergy.co.nz

www.naturesflame.co.nz