

The **Tullis Russell** Biomass twin conveying system

With an overall project cost in excess of £200 million Scotland's mega 50MWe renewable plant biomass combined heat and power plant (CHP) at Markinch in Fife, commenced build in 2010 and was fully operational in 2013, being the largest of its kind in Scotland.

The new Biomass CHP lies in the grounds of Tullis Russell Paper Makers and replaced their existing coal fired power plant, reinforcing the company's position as one of the world's leading environmentally focused papermakers.

- **Awarded a prestigious contract to supply a twin conveying system complete with towers and all steelwork as part of one of the largest biomass energy plants in Scotland, Canning Conveyor stepped up to the challenge and delivered a robust, efficient and reliable system for the bulk conveying of materials for the Fuel Handling System.**





Working alongside project manager Saxlund, Canning Conveyor separately negotiated their contract for the Tullis Russell site, for the design, detail, manufacture, construction and supply of biomass reception conveyors to screens; the elevating belt conveyor system to feed three separate storage silos and the reclaim belt conveyors from the silos to the boiler feed system as part of a biomass fuel handling system for the power station.

The function of the conveyor system

The function of the Conveyor System is to receive solid fuel from the Bulk Material Handling Units and deliver it to the day storage silos, from where it conveys a measured amount of material to the boiler plant located on the same site. The system has been designed to have two streams of conveyors that operate independently of, and run parallel to, each other and is designed to be suitable for operation with a blend of recycled and virgin wood.

The conveyor system from reception to storage has a design capacity of 920m³/hr. with an operating capacity of 765m³/hr. The conveyor design rating from storage to boiler plant has a design capacity of 345m³/hr. with an operating capacity of 285m³/hr. There are four defined areas:

Reception and Screening Area Conveyors - area 1

With incoming trucks depositing their load of pre-shredded recycled and virgin wood into the reception hoppers, material is deposited by mobile belt feeders (by others) onto the twin reception conveyors.

Running horizontally at ground level the 1200mm wide x 67 metres long troughed belt conveyors are designed to accept up to 975cu.m/hr of incoming material with a bulk density of up to 500kg/cu.m, (based on the calculation of 125% of the desired 780cu.m/hr maximum) which the feed points will allow to flow. These conveyors then elevate up via catenaries to discharge via fixed chutes which are an integral part directing material into the disc screens which remove oversize materials.

Positioned above each reception conveyor are cross belt permanent magnetic separators, which have been designed for continuous removal of magnetic ferrous metal from the material being passed beneath them. Magnetic ferrous metal is attracted to the magnetic face leaving the cleaned product on the conveyor below. The ferrous material is then carried by the continuously moving belts on the magnetic separators and discharged to the front of the machines, via fixed integral non-magnetic chutes, into a ferrous metal collection skip.

Inclined Transfer Belt Conveyors - area 2

From the disc screens material is conveyed by the twin inclined transfer belt conveyors. These are troughed belt conveyors which utilise a totally enclosed air supported belt system with disc type return rollers. These conveyors run horizontally at ground level accepting material from the



undersize chutes of the disc screens (by others) before elevating via heavy duty lattice gantries to a height of approximately 30 metres, before discharging at the top of transfer tower A.

This tower designed and manufactured by Canning features two floors; complete with access doors from walkways on all conveyors it incorporates a lifting beam complete with electric hoist. This tower supports the head/discharge ends of the twin transfer conveyors and the tail end of the main silo feed conveyors which are integrally fitted with fixed chutes directing the discharge onto the silo feed conveyors.

Silo Feed Transfer Conveyors - area 3

From the transfer tower the twin conveyors elevate slightly and discharge via two-way diverter chutes onto the 'Silo 2' feed conveyors, or directly into 'Silo 1', which is achieved by the means of electrically actuated operated flap doors. The 'Silo 2' feed conveyors, also elevate slightly and discharge by a two-way diverter

chutes directly onto the 'Silo 3' feed conveyors, or directly into 'Silo 2', again by the means of electrically actuated operated flap doors. The final twin conveyor feed runs horizontally, and discharges directly into 'Silo 3'. The entire twin feed conveyors are enclosed in heavy structure lattice gantries.





Outbye Reclaim Conveyors - area 4

Situated at ground level next to the three storage silos, these twin 41m long troughed belt conveyors are designed to convey up to 345cu.m/hr of pre-shredded recycled and virgin wood with a bulk density of up to 500kg/cu.m, (based on the calculation of 125% of the desired 280cu.m/hr) which is the maximum the feed points will allow. Running horizontally these conveyors accept material from any one of the three reclaim chain conveyors (by others) and then elevate slightly to feed onto the outbye weigh belt transfer conveyors.

Outbye Weigh Belt Transfer Conveyors

These twin trough belt conveyors receive feed from the outbye reclaim conveyors at a rate of 345m₃/hr with a bulk density of up to 280m₃/hr.; which again is the maximum the feed points will allow. Elevating over the full length of 44 metres they then discharge via diverter chute onto the chain conveyors (by others) which feed the boiler house. Each of these conveyors is fitted with a Board of Trade certified belt weigher, and moisture monitoring equipment.

A successful installation

As well as the design, detail, manufacture and supply of the twin conveying system Canning Conveyor completed and managed the site build up, installation, belt fitting, vulcanising and commissioning for the system. The support gantries and platforms, all steelwork, access platforms and gantries were all manufactured in the Canning workshops, delivered and erected on-site by the Canning engineers.

Working above current health and safety standards the Canning team spent considerable time working alongside sub-contractors; constantly maintaining a high and efficient standard within all areas of the build including ATEX areas and installation of equipment.

▶ **Andrew Canning - MD, commented, “The project has allowed Canning Conveyor to demonstrate the quality of their engineering and project management competence coupled with the ability to be cost effective in a competitive market.”**

