Case study: Waste minimisation through offsite construction

Pre-cast concrete construction

Bison Concrete Product Limited

Pre-cast concrete: A long history

Pre-cast concrete construction components have been extensively used for over 150 years. They are used for the construction of various equipment and buildings, from railway sleepers to bridge structures, from houses to stadia. The use of pre-cast elements reduces the requirements for conventional onsite shutters and temporary supports that often generate significant amounts of waste. The use of pre-cast concrete offsite construction methods has the potential to reduce the generation of waste on construction sites by up to 50% compared to traditional construction.

From design to erection: Efficient resource use

Through integrated design and manufacturing processes, pre-cast concrete methods utilise less materials than the equivalent elements cast in-situ. By using pre-stressed reinforcing steel, manufacturers can reduce the amount of steel required by up to 30%. The manufacturing facilities reuse the forms and shutters, therefore the waste due to forming the concrete is reduced to negligible amounts. Over all, modern facilities generate less than 1% of waste with most of the concrete and steel being recycled.

Bison: Experience and sustainability

Bison Concrete Product Limited is very focussed on the production of environmentally sound products and strives to reach a waste free design and manufacturing process. By working closely with its supply chain, Bison aims to improve the efficient use of resources, reduce lorry journeys and nearly eliminate waste sent to landfill. Last year, Bison sent less than 1% of the material weight processed to landfill.

Key facts

- The use of pre-cast concrete offsite construction has the potential to reduce on site waste by 50%.
- The manufacturing process produces less than 1% waste to landfill.

Pre-cast concrete offsite methods

Pre-cast concrete offsite construction methods have the potential to reduce waste on site by 50% when compared to traditional build. They offer the flexibility required by clients and are suitable for a number of different construction applications. By involving the supply chain and integrating the design and manufacturing processes, Bison Concrete, as an exemplar in their industry, has been able to achieve near zero waste to landfill through its manufacturing process with less than 1% of the material sent to landfill.
The design stage

Bison has developed a series of tools to help the design engineer to accommodate the client’s needs whilst using standard details. This CAD-CAM based software eliminates errors and makes use of predetermined manufacturing methods and details, avoiding errors.

The manufacturing process

Hollow core section floor elements are manufactured in a fully automated factory set up. The design of the manufacturing facilities has ensured that harvested rain water is used, thus saving 1 million litres of water a year. The highly efficient manufacturing plant has trenches with drag chains that collect wasted concrete and recycle it into the concrete mix. Further more, all hardened concrete is broken down and reused as aggregates either for Bison own use or as class 1 aggregate for roads.

Other pre-cast elements are manufactured using rechargeable steel shutters. In some instances, timber is used to provide special angles and to form structural elements. This timber is then reused in the fabrication of walls and ultimately sent to landfill. Steel reinforcing bars are preassembled by the subcontractors and delivered to the factory on a just-in-time basis. This has eliminated all waste associated to concrete re-enforcement on site. Overall, the waste sent to landfill (mainly timber) represents less than 1% of the materials processed at the factory.

Delivery on site

All concrete products are prepared and stored on steel lorry beds. These beds are loaded up onto a lorry when the order is completed and ready to be delivered to site. Installation on site of the elements previously required the use of small timber shutters. Lately, Bison has introduced reusable plastic end caps that eliminate the need for shuttering on site, resulting in minimal waste generated by the installation on site.

For more details on the waste saving that pre-cast concrete construction methods can offer, please consult the full length report on www.wrap.org.uk/construction