

Day Group's Tolworth site bags its own rail aggregate discharge system

Twin bagging lines installed in the spring served by a rail discharge system are helping Day Group achieve growth in the bagged aggregates sector, reports. Ross Matthews.

The market for bagged aggregate is being affected by the current economic situation according to day Group. However, many builders' merchants, driven by the demands of their customers, have significantly increased their stocks of bagged compared to loose aggregates. In addition, the current cost of road haulage combined with the continually growing problems of traffic congestion, means transporting aggregates for bagging from quarries wherever possible by rail makes good economic sense, particularly if the discharge method is efficient.

Hub-4's first ever issue featured the new rail discharge system at Day Group's, site in the south London commuter town of Purley. The supplier of primary and recycled aggregates for the construction and landscaping industry used the experience it gained from that site when installing a similar system in Tolworth in south west London during the spring of 2008. The Tolworth site was established about ten years ago as a strategic fit between its sites at Purley and Brentford to provide comprehensive coverage of the south east region. Ten people at Tolworth, a figure likely to increase to 14 to handle new business, keep the site operating between 7am to 5pm on weekdays and just to 1pm on Saturday.

In addition to serving the neighbouring

London Concrete plant with bulk aggregates, the Tolworth site sends out bagged aggregates from the bagging plant installed during the summer of 2007. Day gained an increased share of the bagging market as well as in bulk haulage for the builders' merchant trade when it bought CJ Burgess in 2005. It saw an opportunity to add value to Tolworth by providing bagging from the site and subsequently secured a significant contract with building product supplier Wolseley UK.

The bagging plant started producing in July 2007 and now also supplies several independents. Thanks particularly to important recent bagging contracts, Tolworth will be increasing the 70,000 tonnes of bagged aggregate it supplied in its first year. "We expect to be heading towards between 150,000-175,000 tonnes even in the current climate," says Michael Woodward, project manager for Day Group at Tolworth.

Having a more efficient means of receiving and unloading aggregate to facilitate this kind of throughput became an imperative for Tolworth, which was originally operating simply as a railhead where the aggregates were grab discharged from the wagons. So, the Rail Discharge System was built using DUO Manufacturing (LJH) as main contractor. ▶



The bagging plant

Aggregate from the stockpiles in the yard at Tolworth is taken by shovel loaders to two bulk hoppers that serve the London Concrete plant and Day's four bagging lines - two bulk bag and two 25kg bag lines.

Staff inside the bagging plant will notify the shovel operator the type of aggregate that they need to bag allowing the operator to go to the bay holding the required aggregates and take the necessary amount to the bagging plant feed hopper. A digital display board informs shovel operators of the level of material in each of the four hoppers that supply each of the bagging lines installed in the spring of 2008 by Webster Griffin.

In terms of tonnages bagged in the plant – approximately 30% is sharp sand, 30% ballast and 30% soft sand. The other 10% made up with shingles and sub base.

One of the 25 kg bagging lines is a semi-automatic line where the operator mounts a pre-formed bag on the machine, which then fills and seals the bag before sending it via a roller conveyor to a robot for palletising. This semi-automatic machine fills nine 25 kg bags a minute.

The second 25 kg line employs a fully automatic “form, fill and seal” bagging machine, which can also print a description of the contents on the bag. A roll of film is fed

through a series of rollers and automatically centres itself on the forming tube and the length of bag is then filled with aggregate. Day holds rolls of film with customer's print on it as well as plain film – the automated machine has three printing heads that can print on the bag's sides as well as front so when bags are palletised and stacked the contents can be easily identified. The machine then seals the top of lower bag and bottom of the filled bag and sends the filled bag on a roller conveyor to this line's own robot.

Why are the lines not both fully automatic? Well, the semi-automated bagging machine gives Day's bagging operation flexibility. *“It's not economic to buy large amounts of film for independent builders' merchants so we need the flexibility to bag for either a large client or the smaller independents.”*

The two 25 kg bagging lines each have their own palletising robot. Originally just one robot was used then a second was bought to handle additional capacity. However using one robot meant it had to turn 180 degrees pick up a bag from the each of the two roller conveyors - one from the semi-automated bagging machine, the other from the automated unit - and stack it on the pallet. Adding the second robot to work in tandem means each robot now only needs turn 90 degrees and this speeds up the process considerably. Having two robots also helps keep operations moving if one requires maintenance.

It takes just 2.5 minutes in total for the automated line, and 5 minutes for the semi-automated line, to stack the fifty 25 kg bags on a pallet.

“The quality of stacking is very good,” says Michael. *“We spent a lot of time getting that right so that we don't need to shrink wrap. The bags have a non-slip layer on the outside to create resistance when they sit on top of each other. This keeps the stack stable.”*

Day is currently increasing its 1000 tonnes a week bagging plant throughput to 2000 tonnes a week and with the hope of additional business, it will increase this still further. This will close in on the system's current capacity so further investment may be required in the future if demand increases.



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Day ran the first train through the Rail Discharge System in the Tolworth Aggregate Depot during the first week of April 2008. Since then there has been an average of three trains a week delivering aggregate from Foster Yeoman's Torr Works quarry in Somerset and Bretts at Cliffe in Kent. With the anticipated increase in volumes, there will be up to five trains a week arriving at the depot.

"The Rail Discharge System gives us an efficient and environmentally convenient means of delivering aggregates and also provides a significant advantage in terms of serving our markets," says Michael.

Essentially similar to the systems operated at Day's other sites, the system has a number of differences to meet Tolworth's requirements. Located at the bottom of the Tolworth site - and adjacent to Tolworth mainline station - the Aggregate Depot itself is built on a slightly lower level to the rest of the yard and is smaller than the depot in Purley due to the space restrictions.

The discharge system is housed in composite clad building providing noise attenuation, which, at 8 m, is long enough to hold a wagon while it discharges.

Whereas the Purley system has two large hoppers beneath the discharge point from which two conveyors feed onto the main conveyor, at Tolworth the aggregate discharge drops onto a 1800 mm wide conveyor, which in turn drops onto a 1400 mm wide incline conveyor angled at 18.5 degrees and is equipped with a belt weigher.

Material is fed by this conveyor up to the main tripper conveyor (1400 mm wide) that travels along the top of the walls of the concrete stockpiling bays lined along the yard and then when the required bay for the aggregate is reached it transfers onto the carriage mounted cross conveyor (1400 mm wide), which deposits the aggregates in the bay. The conveyor feeds to both sides of the tripper and is counterweighted to balance the load on the tripper rails. Ultrasonic level sensors and a back up deflection probe prevents bays being overfilled.

Unlike Purley, there was not sufficient space to install a ground hopper with a conveyor feeding from it because with the height difference between the depot and the yard, the ground hoppers would have been at a very deep level, presenting too steep an angle for the conveyor to deliver to the main conveyor over the stockpile bays.

Although contrary to Purley, the Tolworth discharge system's design means that the conveyor system is not kept loaded whilst the train shunts between wagons, the time difference is not significant: the system still only takes about 1 hour 15 mins to discharge a whole 18 wagon train and requires just one person to operate.

"The system capacity is actually 1400 tph but, with shunting time, discharge is approximately 1200 tph," says Michael, adding: *"This solution not only fits the space restrictions at Tolworth but with fewer conveyors and equipment to maintain it is a more cost effective solution."*

From the computer control panel inside the building the operators can see the entire system operation on the graphical interface, including the bays for each of the aggregates: marine sharp washed sand; 10 and 20mm shingle; scalplings; type 1 limestone; 20 mm ballast and 4/20 limestone

Like the Purley site, although in a different configuration, Day can blend recycled aggregates from a refeed hopper with the primary aggregates being discharged.

"Depending on what we are discharging from the train and customer specific requirements we might want to blend recycled sharp sand, recycled glass sand or recycled sub-base material from our C&D plants," says Michael.

The recycled aggregates from the re-feed hopper can be introduced in blend ratios of between 5 and 40% using the control interface's main menu. The blending process is very efficient as the materials are mixed in three places along the aggregates journey from train to stockpile - first as it is being discharged, then at the transfer point onto the cross conveyor and finally when it comes off the end of the cross conveyor into the stockpile.

All in all the Rail Discharge System certainly fits Day's philosophy of using automation and environmental consideration.

"Another environmental benefit of the system is that from outside, you cannot hear the discharge from the trains, whereas previously, when grab discharging the operation was clearly audible." The depot is also extremely clean and orderly. *"We like to keep it that way."*

