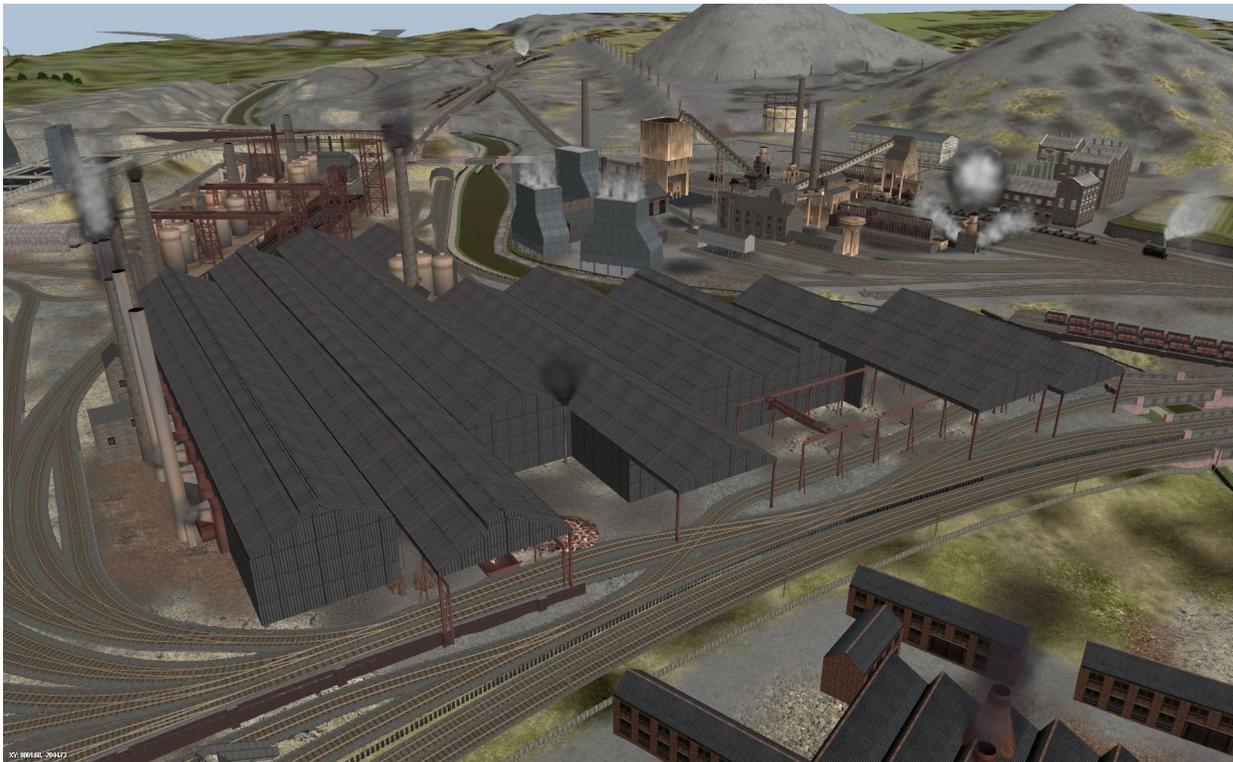


Shelton Bar Operations

Overview

In 1938, Shelton Iron and Steel was the largest industrial site in North Staffordshire and the Shelton company was the largest enterprise, owning 7 coal and ironstone mines in the area. The works had a long history stretching back to 1839. Over such a long time the technology employed and the business focus underwent major change. Between the world wars, under the proprietorship of John Summers and Sons, Shelton Bar was primarily an iron works with over half its output being shipped out as cold pig iron, mainly to the Summer's cold charged steelmaking facility at Shotton in North Wales. The remainder of the iron was fed to 5 open hearth furnaces, the steel output of which was rolled locally.



In this screenshot of the works you can see the Potteries loop line running from Etruria junction at the bottom left across to the centre right, towards Hanley. The cluster of large steel sheds at the image centre houses the open-hearth furnaces and the rolling mill. Above and to the left of the sheds are the 3 blast furnaces, while above and to the right of the sheds are the tall stacks of the 3 coke-oven batteries. Top left of centre are rakes of wagons standing in North yard. This yard features in the session, holding wagons loaded with iron ore, coking coal, and limestone, as well as empty rakes of wagons that have been unloaded.

Shelton Bar had an extensive private railway network to transport the raw materials, intermediate and finished products to and from LMS exchange sidings and within the works. Shelton's traffic was entrusted to a sizeable fleet of locomotives, mainly sourced from Barclays although others from Bagnall, Hawthorn, and Peckett were in use. Most of these engines were 0-4-0 saddle tanks but 0-6-0 examples were employed on the heavier duties.

This session utilises the Shedmaster rule to illustrate the range of railway activities necessary to keep Shelton Iron and Steel operating. It covers not only the tasks performed by the locomotives of the private railway, but also the complementary arrivals and departures of LMS trains to and from the exchange sidings at Etruria and Grange Junction, and Stoke MPD. The bustle of train movements are not orchestrated by a timetable. Rather the demands of the works are collected by Shedmaster and railway resources are managed dynamically to meet those demands. If the industry start conditions are altered, then the nature of the session - what happens on the railways and when - will change in response. If service requests cannot be met immediately due to no appropriate locomotive being available, then Shedmaster queues the requests until a loco becomes available. If there are no wagons of a type required to meet a request, then Shedmaster declines the request by the industry, which will try again after a delay.

Types of railway activities in the session

The industrial assets that make up the model of Shelton Iron and Steel send service requests to Shedmaster for the provision of process inputs and the removal of process outputs. These requests are assessed by Shedmaster and an appropriate locomotive is assigned the task that will meet the industry request by sourcing inputs from stocks of loaded wagons or removing wagons loaded with outputs to stocks held in works sidings. Over time the stocks of industry inputs held in loaded wagons declines and must be replenished from outside the works. Similarly, the stock of wagons loaded with industry outputs accumulates to a point where the wagons must be cleared to destinations outside the works. In the discussion below, the tasks have been sorted into types so that the big picture can be appreciated. The order of the task types follows the transition path of inputs into outputs.

1. Replenishing stocks of industry inputs



Works locomotives are responsible for performing tasks that transfer inputs stored in wagons located in works 'source' sidings to an unloading point for a particular industry process. Subsequent to removing some wagons from a siding, the task schedule of the appointed locomotive includes driver commands that measure the number of wagons remaining in the source siding and, if this number has fallen below a critical number, causes an LMS trainload of the input commodity to be issued from a portal. The LMS trainloads are left in arrivals roads in Etruria and Grange Junction yards. Having uncoupled from their trains and on the way to Stoke MPD, the LMS loco schedules raise service requests with Shedmaster for the transfer of the trainloads into the nearby inputs source sidings. 2 LMS tank locomotives are available for these transfer tasks, which include the storage of the LMS guards vans attached to the arrived main line trains.

The flip side of taking loaded wagons to an industry is the accumulation of returned empty wagons. You will see trainloads of empty wagons taken away by LMS locomotives, back to the input suppliers for loading.

2. Providing inputs to industry assets



There is one coal unloader servicing the 3 coke-oven batteries in the works. When the amount of coal stored at the unloader falls below a threshold due to consumption by the batteries, a works loco is assigned the task of bringing loaded wagons from North yard to the unloader. The empties are taken to Etruria yard for return to the supplying colliery.

The 3 works blast furnaces each have 3 hoppers into which iron ore, coke and limestone may be dropped from wagons passing overhead. During furnace charging, a gantry crane positions a tipping vessel at the base of the hoppers for loading, then the crane lifts and transports the vessel to the top of the furnace where the contents are tipped. When levels in the hoppers fall below threshold levels

Shedmaster appoints a works loco to bring loaded wagons for dumping into the hoppers. In the case of iron ore and limestone, the source sidings are in North yard, as are the deposit sidings for the return empty wagons. Coke is an intermediate works product discussed in the next section.

Shelton Iron and Steel Sheds consumes molten iron from the blast furnaces, scrap metal and coal. Molten iron (hot metal) is another intermediate works product handled in the next section. Scrap metal is held in a large bunker at the south end of the sheds, adjacent to the Potteries Loop Line. When its level falls below a threshold, a works loco brings wagons loaded with scrap from storage at Etruria yard for emptying to the bunker. The empties are returned to another siding in Etruria yard. A stockpile of coal occupies ground on the east side of the sheds alongside the canal. When this nears exhaustion, a works loco is assigned to take loaded wagons from storage sidings near the Loop Line's bridge over the canal. Another siding at the same location accepts the empties.

3. Internal works transfers of intermediate products



Coke accumulates on the wharves of the coke-oven batteries. When a wharf level exceeds a threshold, a works loco is assigned to bring empty wagons to the wharf for loading. The loaded wagons are stored in sidings adjacent to the batteries. While some coke was sold to external customers, the session shows the coke in store used to top up the coke hoppers of the blast furnaces. So coke is transferred indirectly within the works from the coke ovens output wharves to the blast furnaces input hoppers via storage sidings.

The blast furnaces are tapped at intervals. The taps are of the intermediate works products, slag and molten iron. Slag was produced in a greater proportion, by volume, than molten iron, and so there were more taps of slag than iron. Being less dense than iron, the slag was tapped from higher in the furnace base into tipping ladle wagons. Molten iron was tapped into bucket ladles that could be lifted from the

wagons by crane, Whenever a tap is complete, the blast furnace makes a service request to Shedmaster and a works loco is allocated to take the ladle wagon away for emptying. In the case of slag, the wagon is taken to a dumping point within the works. Molten iron is taken to the Iron and Steel Sheds where a crane empties the ladle into the mixer, prior to its being used to charge the open hearth furnaces. Emptied ladle wagons are returned to the points from where they were taken to await the next tap of the blast furnace.

4. Storing works outputs



Blast furnace #1 at Shelton, the largest of 3, channeled most of its molten iron to casting beds to make cast iron pigs for despatch to Shotton in Wales. The cooled pigs were broken up and taken to the loading wharf by an elevated-wire crane. Once the stacks of pigs are assembled on the wharf, the blast furnace sends a service request to Shedmaster. A loco is assigned the task of bringing empty flat wagons to the wharf, loading the pigs, and depositing the loaded wagons in North yard.

The open hearth furnaces' molten steel output is poured into ingot moulds and the ingots are allowed to solidify before the moulds are stripped off. The ingots are transferred to soaking pits to reheat them to an even temperature prior to their hot rolling into steel bar. After cooling, the steel bars accumulate in stacks placed under a gantry crane at the south end of the sheds. When the number of steel-bar stacks exceeds a threshold number, a service request is sent to Shedmaster. Empty flat wagons are brought adjacent to the gantry crane for loading with steel bar. The loaded wagons are then stored in a siding in Etruria yard.

5. Transporting products to customers and empties to suppliers



Deposit sidings receive wagons for storage subsequent to unloading or loading at an industry bay. Over time, wagons accumulate in deposit sidings and siding space will become exhausted unless action is taken. The works locomotive that brings wagons to a deposit siding has a schedule that measures the siding occupancy. If too high, the schedule initiates a service request with Shedmaster for the removal of a trainload of wagons from the deposit siding.

In the case of deposit sidings in Etruria yard, the task of removal is performed by the Etruria-yard LMS shunter. The trainload is positioned in a departures road at Etruria with a guards van attached. The LMS shunter's schedule then pages a loco from Stoke MPD to take the train away to a customer of works outputs or a supplier of works inputs.

Deposit sidings in North yard are handled differently. North yard is an internal works yard, so the handover to LMS cannot occur here. Instead, the handover occurs nearby on the Grange branch line. When the schedule of the works loco that deposits wagons in North yard decides that the siding is fully occupied, Shedmaster is informed and it allocates another works loco at the northern extremity of the yard to remove a trainload from the siding, add a guards van, and draw the trainload out onto the Grange branch. While this is happening, the Grange Junction LMS shunter positions itself on Grange branch to take over the trainload from the works loco. The trainload is taken to a siding in Grange Junction yard, and the occupancy of this siding is assessed. If the number of wagons exceeds a threshold, then a loco is paged from Stoke MPD to take the trainload away.

Conclusion

There's a lot going on simultaneously in this session, and you won't see it all in one viewing. When the session opens, go to 'free roam' view and move around the works and out to Etruria and Grange

Junction yards to see what captures your attention. You might dwell at busy locations to see how congestion is resolved using Token Management. Or you could take a close look at the many industry process animations. We hope you enjoy the spectacle, and that some session creators are inspired to utilise the tools in use, such as Shedmaster and Token Management, to make more sessions for Potteries Loop Line.

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