



The new nine-road Elizabeth Line depot at Old Oak Common will be brought into use later this year. TAYLOR WOODROW.

END-TO-END EXPERTISE

Depot projects: Building from scratch or upgrading existing facilities - it's all in a day's work for Taylor Woodrow. JEZ HASKINS and FRED GARNER tell PAUL STEPHEN how it's done

London's population continues to grow at the rate of two Tube trainloads of people per week, and the capital's rail network must constantly evolve to meet this increased demand through new high-capacity train fleets and new lines. The Elizabeth Line, due to open in 2018, will be the capital's first new railway for decades.

Extra route miles and more technically advanced rolling stock demands a key but often overlooked component - upgraded depot facilities that meet not only the maintenance and cleaning requirements of new trains, but also the operational requirement of increasingly frequent timetables. They must also offer a safe and efficient working environment for the maintenance teams that are based there, and for the drivers who bring trains in and out.

Additional depot facilities can be created in two ways that each pose different, but similarly demanding, challenges for experienced contractors like Taylor Woodrow to deliver. Building new depots is a multi-disciplinary task combining design, construction, civil engineering, railway systems and operational expertise. On the other hand, modifying or upgrading an existing depot, with its existing and often decades-old infrastructure, adds complexity.

Taylor Woodrow is steeped in experience of delivering both. On the new-build side, it was tasked in 2014 with building a new facility at Old Oak Common to service the Elizabeth Line's new fleet of Bombardier-built Aventras. Meanwhile, the company's ability to upgrade existing facilities has been demonstrated at Ealing Common and Upminster depots, which required upgrading in advance of the replacement of D78 stock on the District Line with S-Stock, from 2015.

Taylor Woodrow directors Jez Haskins and Fred Garner oversaw both infrastructure projects and the development of robust strategies needed to tackle the unique challenges they posed.

Starting with the District Line, the main challenge was that the S-Stock trains were longer, heavier and had a different kinematic

envelop (the space occupied by a vehicle when in motion, including tilt, sway, track cant, etc) to the lower capacity trains being withdrawn. They also required more power and had vastly different maintenance regimes to their predecessors. Haskins says that the easiest option would have been to build new purpose-built sites, but the lack of suitable locations meant Taylor Woodrow would need to work with existing depots at Upminster and Ealing Common, located at opposite ends of the line. What's more, London Underground required both depots to maintain a level of functionality for existing stock during the build sequence.

"While some depots may lend themselves to a sequence of knock-down and rebuild while maintaining suitable levels of functionality, the cost of such an approach

is often prohibitive to LU in these days of tighter budget constraints," he tells RAIL. "So LU had to look to how it could upgrade its existing facilities to make them fit for 21st century trains. What was most satisfying is that works at both depots were carried out with minimal disruption to the LU depots' operational teams and that we have been able to transform the existing depots, in structures built more than 70 years ago, into state-of-the-art facilities."

Work began in 2011, and the scope of the contract included design, groundworks, new and extended buildings, new permanent way and depot mechanical and electrical services, including power upgrades and depot signalling. Specialist equipment was also needed to maintain the S-Stock, such as overhead craneage and a synchronised jacking system built by Pfaff-silberblau.

At Upminster, stabling capacity was expanded at the start of the build sequence to enable new trains to be housed alongside the existing D78s, as the latter were phased out and eight sidings were installed on reclaimed land within the depot's existing footprint.

The maintenance shed was then divided with a full-height acoustic barrier running along its entire length to keep two roads open for continued maintenance, while the Taylor Woodrow team worked on the other

side, converting the other six roads to four. The building was then underpinned by engineers to increase its strength, while the team also managed noise, dust and vibration levels in order to limit disruption to adjacent and ongoing train maintenance.

At Ealing a similar process was followed, and Taylor Woodrow was able to occupy the eastern Acton end of its three sheds while leaving all the roads into the western Ealing end fully functioning.

Five roads in the yard were equipped with new train arrestors, trip cock lights and walkways for the stabling of S-Stock and D-Stock trains together.

The shed roofs and inspection pits below the rails were extended at the Acton end to accommodate longer S-Stock trains, while synchronised heavy lifting jacks were installed on road one, capable of lifting an S-Stock train in its entirety. Five roads were reduced to three, and the remaining two roads equipped with fixed platforms for internal and external cleaning. Finally, traction power was upgraded and all stabling roads received extended walkways, modified conductor rails and new trip cock lighting.

The majority of the civil, permanent way and traction power works on the stabling roads outside the sheds were undertaken during weekend possessions to further minimise disruption.

Over in west London, adjacent to the main line approach into Paddington, Taylor Woodrow's new-build project at Old Oak Common for TfL and Bombardier is being gradually brought into use over the course of 2017, following the completion of construction of its Operations, Maintenance and Control (OMC) building. The depot has nine roads in the maintenance building and 33 external sidings. Its scale is impressive and the depot will be equipped with a wheel lathe, two-road bogie drop, train washing facilities and extensive workshops, stores, offices and drivers' accommodation. It also has impeccable green credentials and its deployment of renewable energy systems,

including solar panels and ground source heat pumps, deservedly earned it RAIL's National Rail Award for sustainability in September 2016.

Garner adds: "We really hope that other clients in the sector take a look at what can be done with green energy sources in the depot environment, and we believe our work at Old Oak Common is at the leading edge in this field."

"It is very rewarding to see the project enter its final stages, and over the course of 2017 we have several key milestones to achieve. We will first give access to MTR Crossrail, who will operate the Elizabeth line on behalf of TfL, to start the fit out of their office space, and then over the summer commission signalling and traction power along with our main line connection to allow a test train to access the depot. Finally, external sidings will be brought into use with the OMC building as units start to arrive from the Bombardier production line in Derby.

Garner describes the biggest challenges of the project as co-ordinating the design of around 30 different subsystems, and then guiding it through a rigorous assurance process with TfL as Bombardier's client. It is also necessary to co-ordinate the works with Network Rail, concerning the connection to the main line, which is just 1/4 miles from Britain's eighth busiest station - Paddington.

He concludes: "Old Oak Common is hemmed in between the Grand Union Canal to the north and the existing Great Western Main Line depot approach roads to the south. It's been a challenge to fit in all the necessary cables, pipes and underground tanks, but the team has worked incredibly well to solve a number of perplexing challenges in the critical throat area of the depot."

"Our team enjoys the challenges provided by this type of environment, however, and I know it will give them a great feeling of satisfaction, when they travel on the new trains, to know they've played their part in making it happen." ■



New hydraulic jacks at Upminster depot can lift an entire S-Stock train. TAYLOR WOODROW.



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Jez Haskins, Sector Director, Taylor Woodrow